Montclair State University
Montclair State University Digital Commons

Theses, Dissertations and Culminating Projects

8-2019

Assessment of Mean Annual Precipitation and pCO_2 Effect on C_3 Land Plant Carbon Isotope Fractionation

Woohee Kim
Montclair State University

ABSTRACT

Modern carbon dioxide (CO_2) levels are well known from instrumental observation (just exceeded 415 ppmv on May 13th, 2019). CO_2 levels (pCO_2) in the past, however, are difficult to obtain, especially for geologic time older than 800 thousand years (kyr). Many proxies have been used to infer past CO_2 levels in the geologic records, but the results are often incomplete and inconsistent. Here, I assess the uncertainty of a new pCO_2 proxy that has great potential to reconstruct continuous pCO_2 records across the entire Phanerozoic. This new proxy is based on stable carbon isotope fractionation ($\Delta^{13}C$) of C_3 land plants because growth chamber experiments and field observations suggest pCO_2 goes up as $\Delta^{13}C$ increases for pCO_2 ranges from 198 to 4200 ppm. Although this proxy has been applied widely in the Cenozoic, recent studies raise concerns that the $\Delta^{13}C$ of C_3 land plants can be affected by mean annual precipitation (MAP), plant species and mean annual temperature (MAT) in addition to pCO_2. Modern C_3 land plants reveal a positive correlation between $\Delta^{13}C$ and MAP, as well as MAT. The effect of both MAP and CO_2 on $\Delta^{13}C$, however, is unknown, making it difficult to interpret the carbon isotope signals in the sedimentary records. The main objective of this work is to assess the extent to which the uncertainty of pCO_2 reconstruction in the geological records can be reduced given independent knowledge of MAP and MAT. I hypothesize that if MAP is known at any given time in the geologic past, then pCO_2 can be estimated with reduced uncertainty. This hypothesis is tested by accounting for changes in MAP in the Quaternary using multi-regression relationship obtained from large modern dataset. Least square multi-regression suggests +0.2‰ changes in $\Delta^{13}C$ per 100 mm yr^{-1} changes in MAP while holding pCO_2 constant, and -1.8‰ changes in $\Delta^{13}C$ per 100 ppm changes in pCO_2 while holding MAP constant [$\Delta^{13}C = 25.1 + (0.002) * MAP - (0.02) * pCO_2$ ($r^2 = 0.40$, $p < 0.0001$)]. This study provides potential for accounting for changes

in MAP usage of this regression equation to offer more precise pCO_2 estimates in the geological records. The reduction in pCO_2 uncertainty using this unique proxy can help better understand how climate will change in the future due to anthropogenic CO_2 emissions.

MONTCLAIR STATE UNIVERSITY

Assessment of mean annual precipitation and pCO_2 effect on C_3 land plant carbon isotope fractionation

by

Woohee Kim

A Master's Thesis Submitted to the Faculty of

Montclair State University

In Partial Fulfillment of the Requirements

for the Degree of

Master of Science

August 2019

College of Science and Mathematics

Department of Earth and Environmental Studies

Thesis Committee:

[redacted]

Dr. Ying Cui

[redacted]

Dr. Clement A. Alo

Committee Member

[redacted]

Dr. Danlin Yu

Committee Member

Assessment of mean annual precipitation and $p$$CO_2$ effect on C_3 land plant carbon isotope fractionation

A THESIS

Submitted in partial fulfillment of the requirements

for the degree of Master of Science

by

Woohee Kim

Montclair State University

Montclair, NJ

2019

ACKNOWLEDGEMENTS

I want to extend the deepest gratitude to my thesis sponsor, Dr. Ying Cui and to my committee members, Dr. Clement Alo and Dr. Danlin Yu. I appreciate the many research opportunities Dr. Cui gave me. As a mentor, she always helped me with personal life and studies and gave sage advice and guidance. Without her supportive guidance and help, this thesis would not have been possible. To Dr. Alo, thank you for providing advice about my thesis. To Dr. Yu, thank you for your instruction on GIS added geographic significance to my research.

In addition to my committee members, I would like to thank Mike Ayers for helping me to enjoy life at Montclair State University. Also, thank you Junkui Cui, Archana Prasad, and Sana Mirza for spending our last two years together.

Finally, I would like to thank my family for the support and encouragement throughout my graduate school life. I have no words to express my thanks.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

1. INTRODUCTION

1.1 CO_2 and Paleoclimate

It has long been recognized that the Earth's primary climate driver is carbon dioxide (CO_2) in the atmosphere (Royer et al., 2001; Beerling & Royer, 2011; Foster et al., 2017) (Figure. 1 – Earth history CO_2 concentration from proxies and a global temperature reconstruction). Temperature and precipitation are the main components of regional climate, which are controlled by the energy balance of the incoming solar energy and the long-wave radiation by greenhouse gases, in particular atmospheric CO_2. Recently, atmospheric CO_2 levels (partial pressure of CO_2 or pCO_2) observed at Mauna Loa, Hawaii has exceeded 415 parts per million (or ppm) (Dockrill, 2019). Moreover, the rate of CO_2 emission has increased to > 9 Pg C/yr (1 Pg C = 10^{15} grams of carbon) due to the burning of fossil fuels and the production of cement (Le Quéré et al., 2017). If the CO_2 levels continue to rise at an accelerated rate, the global temperature increase is likely to go beyond 2 °C, a benchmark that the scientific community has previously viewed as a threat to polar ice sheet destabilization, which could further increase global sea levels (Jevrejeva et al., 2016) and result in more frequent droughts and extreme precipitation events (Kothavala, 1997).

The pCO_2 and the tropical seawater temperature show strong coupling in the Phanerozoic (541 Million years ago or Ma to present) based on the reconstructions from several pCO_2 proxies such as paleosols, liverworts, boron isotopes, alkenones, stomata, C_3 land plants, among others (Beerling & Royer, 2011; Royer et al., 2014; Foster et al., 2017; Cui & Schubert, 2018) and temperature proxies such as $\delta^{18}O$ of carbonate and phosphate, and clumped isotopes (Henke et al., 2017). This allows for a clearer picture of CO_2-driving temperature change to emerge, but the details of the CO_2-variations are controversial due to the varying sampling resolution of different proxies and the unknown physiology in many extinct species (Royer et al., 2001). In addition, some CO_2 proxy data are associated with large uncertainties, often unquantified in the geological records (Breecker, 2013; Cotton & Sheldon, 2012). This led to the idea of applying a uniform, well-calibrated (uncertainty quantified) proxy to be used systematically in the fossil records (Breecker, 2013; Pagani, 2014; Cui & Schubert, 2016). C_3 land plant carbon isotope proxy is a novel approach to reconstruct atmospheric pCO_2 using stable carbon isotope fractionation as detailed below. This study seeks to refine the C_3 land plant carbon isotope proxy by accounting for environmental variabilities in the geologic records to better understand the paleoclimate in the Phanerozoic. The main goal is to assess environmental controls, in particular mean annual precipitation and atmospheric pCO_2 on carbon isotope fractionation of C_3 land plants.

1.2 Stable Carbon Isotopes of C_3 Land Plants

The stable carbon isotopes of land plants ($\delta^{13}C$) have been widely measured in sedimentary organic matter as a proxy for past environmental changes (Nordt et al., 2016; Castaños et al., 2014; Coltrain et al., 2004; Fox-Dobbs et al., 2008; Raghavan et al., 2014). $\delta^{13}C$ can be expressed as the following (Eq.1).

$$\delta^{13}\mathrm{C} = \frac{(\frac{^{13}C}{^{12}C})sample - (\frac{^{13}C}{^{12}C})standard}{(\frac{^{13}C}{^{12}C})standard} \times 1000 \text{ (Equation 1)}$$

Where ^{12}C and ^{13}C are the two stable isotopes of carbon, sample represents the samples measured, and standard denotes the international standard Vienna Pee Dee Belemnite (VPDB).

Carbon isotopic fractionation [$\Delta^{13}C = a + (b-a) \times C_i/C_a$] takes place during CO_2 diffusion (a = 4.4‰) and carboxylation by Rubisco (ribulose 1,5-bisphosphate carboxylase/oxygenase) (b = 26 to 30‰) because kinetics allows for the preferential uptake of the ^{12}C (Schubert & Jahren, 2018; Farquhar et al., 1989) (C_i/C_a is the ratio of intercellular and ambient partial pressure of CO_2).

About 85% of the land plants species in the Earth's surface are C_3 land plants, whose initial photosynthetic carbon assimilation product is 3-phosphoglycerate ($C_3H_7O_7P$), in contrast to the malic acid ($C_4H_6O_5$) produced by C_4 photosynthesis. C_3 land plants prefer cooler growing temperatures (Winslow et al., 2003) and play an important role in the carbon cycle for the majority of the Earth's history since the rise of vascular plants (Arens et al., 2000). Through photosynthesis, C_3 terrestrial plants show a wide range of $\delta^{13}C$ values from -37 to -20‰ (Kohn, 2010). C_3 plants are more widely used in paleoclimate reconstruction because C_4 plants may have not evolved until the Miocene (Osborne, 2008; Sage, 2004), and are often associated with lower pCO_2 levels and higher water efficiency (Sage, 2004; O'Leary, 1988). The $\Delta^{13}C$ of C_3 land plants are partly controlled by stomatal conductance or photosynthetic rate (Farquhar & Sharkey, 1982). Recently, Schubert and Jahren (2018) suggested that the $\Delta^{13}C$ can change without varying either photosynthetic rate or stomatal conductance, rather it is dependent on pCO_2 and carbon isotope discrimination during photorespiration (9.1 to 22‰) while maintaining a constant CO_2 compensation point at 40 ppm.

Previous studies have attempted to demonstrate that pCO_2 is a main control on $\Delta^{13}C$ (Hare et al., 2018; Schubert & Jahren, 2012, 2015, 2018; Cui & Schubert, 2016, 2017, 2018). Schubert and Jahren (2012) collected C_3 plant data from plant growth chambers across fifteen pCO_2 levels to further demonstrate the relationship between $\Delta^{13}C$ and pCO_2 can be described as a hyperbolic function. In a follow-up study, Schubert and Jahren (2013) show that background and maximum pCO_2 levels can be reconstructed from change in pCO_2 concentrations using both terrestrial and marine records. They then used the differences in marine and terrestrial CIE for the reconstruction of pCO_2 across the Paleocene–Eocene Thermal Maximum (PETM) (Schubert & Jahren, 2013). Later, Schubert and Jahren (2015) reconstructed pCO_2 levels for the past 30 kyr that show good agreement with the ice core records using a global compilation of $\Delta^{13}C$ data from terrestrial organic matter. Additionally, Cui and Schubert (2016) assessed the uncertainty of Schubert and Jahren's (2012, 2013) methods of pCO_2 reconstruction using $\Delta^{13}C$ using a Monte Carlo uncertainty propagation approach and sensitivity analysis.

Furthermore, studies have shown that mean annual precipitation (MAP) affect the $\delta^{13}C$ of C_3 land plants on both global and regional scale (Diefendorf et al., 2010; Kohn, 2010; Basu et al, 2019). Diefendorf et al. (2010) compiled a large dataset of $\Delta^{13}C$ (n = 506) and analyzed the various environmental controls on $\Delta^{13}C$, including MAP, MAT, altitude, latitude and plant functional types. A strong positive correlation between $\Delta^{13}C$ and MAP was shown ($r^2 = 0.56$; Diefendorf et al. 2010). Likewise, Kohn (2010) proved an apparent positive relationship between MAP and $\Delta^{13}C$ ($r^2 = 0.48$, p value < 0.05). Additionally, Basu et al. (2019) extended the number of data and analyzed the correlation between MAP and $\Delta^{13}C$ ($r^2 = 0.36$, p value < 0.05). Despite these efforts to relate pCO_2 to $\Delta^{13}C$ and MAP to $\Delta^{13}C$, no study has been done to systematically investigate the relationship between $\Delta^{13}C$ and both MAP and pCO_2.

Previous studies have limitations in small numbers of samples or focusing too narrowly on specific locations. Here, we report a large compilation based on previous studies of Kohn (2010, 2016), Diefendorf et al. (2010), and Basu et al. (2019) to regress $\Delta^{13}C$ and both MAP and pCO_2 globally and regionally in order to understand the controls of MAP and pCO_2 in stable carbon isotope fractionation of the C_3 land plants. This study compiles a larger dataset and accounts for changes in both MAP and pCO_2 in all continents across the globe. The statistically significant relationship between $\Delta^{13}C$ and both MAP and pCO_2 was applied to the geologic past when MAP is well known from sedimentary records, to reconstruct atmospheric pCO_2 values. We find that the reconstructed pCO_2 is broadly consistent with the ice-core records, and that it is promising to reconstruct MAP with reasonable accuracy and precision if MAP is known at any given time in the geologic past.

2. METHODOLOGY

2.1 Data Collection

The methods discussed below were employed to analyze global carbon isotope data to assess the effects of both MAP and pCO_2 on C_3 land plant carbon isotope fractionation. Extensive literature reviews on carbon isotope fractionations have been conducted similar to studies by Kohn (2010); Diefendorf et al. (2010); Cui and Schubert (2016); Hare et al. (2018); Basu et al. (2019). Previous studies were found to have limitations concerning small numbers of samples or focusing too narrowly on specific locations. Most of these studies showed a significant relationship between carbon isotope fractionation and at least one environmental factor or variable. This study seeks to compile a larger dataset to establish statistically significant relationship between both MAP and pCO_2 and C_3 land plant carbon isotope fractionation ($\Delta^{13}C$).

2.1.1 Modern

In previous studies by Basu et al. (2019), Diefendorf et al. (2010), and Kohn (2010), carbon isotope values were found to be affected by several environmental factors such as mean annual precipitation (MAP), mean annual temperature (MAT) and latitude, among which MAP experts the strongest control on carbon isotope fractionation ($\Delta^{13}C$). However, those published papers did not systematically consider atmospheric pCO_2, an important environmental factor that affects global climate over geologic time. In this study, carbon isotope values of C_3 land plants were extracted from the dataset by Basu et al. (2019) along with the addition of a recently published paper (e.g., Ale et al., 2018). Latitude, longitude, MAP, altitude and MAT data were obtained from National Oceanic and Atmospheric Administration (NOAA) and Google Earth. Plant functional types of this large dataset were distinguished by assigning gymnosperm and angiosperm to individual plants in order to understand the influence of changes in plant species on $\Delta^{13}C$. The C_3 land plants $\delta^{13}C$ data were from year 1980 to 2018 (n = 686) and include sites from Asia, Australia, Europe, Africa and America. pCO_2 values were from the Mauna Loa observatory CO_2 annual mean data were used as independent values according to the publication years of the papers. All of the $\delta^{13}C$ values of long-chain *n*-alkanes were added 5‰ to account for stable carbon isotope fractionation during lipid synthesis in order to obtain $\delta^{13}C$ values of leaf tissues.

2.1.2 Quaternary

A total of 1188 carbon isotope values of herbivores from 2.58 million years ago (Quaternary) were assembled and used as proxies for $\delta^{13}C$ of C_3 land plants based on the animals' diet in an ecosystem. The substrates of fossil animals were bone collagen and tooth enamel. For bone collagen samples, the $\delta^{13}C$ values of C_3 land plants was calculated by subtracting 5‰ from the $\delta^{13}C$ of bone collagen (Froehle et al., 2010; Kohn, 2016). For substrates using tooth enamel, animal species were sorted based on the two major groups of living hoofed mammals (e.g., artiodactyls vs. perissodactyls). Artiodactyls have even numbers of toes, such as cattle, pigs, rabbits and voles, while perissodactyls have odd numbers of toes (e.g. horses, rhinos, and tapirs). Fractionation of 14‰ for perissodactyls and 14.5‰ for artiodactyls were used to calculate the $\delta^{13}C$ values of C_3 land plants from tooth enamel (Cerling and Harris, 1999; Kohn et al., 2015; Passey et al., 2005; Kohn, 2016) (Table 1). In occasions when long-chain *n*-alkane $\delta^{13}C$ values are available, the $\delta^{13}C$ values of C_3 land plants are assumed to be 5 ‰ higher than the $\delta^{13}C$ values of long-chain *n*-alkane.

$\delta^{13}C_{atm}$ values for the modern were from NOAA observations at Mauna Loa (Tans & Keeling, 2012). $\delta^{13}C_{atm}$ values for the Quaternary came from Tipple et al. (2010) and were used to calculate the $\Delta^{13}C$ [$\Delta^{13}C = (\delta^{13}C_{atm} – \delta^{13}C_{org}) / (1+ \delta^{13}C_{org}/1000)$]. The pCO_2 values of the Quaternary were from the ice core records (Lüthi, 2008) and those compiled by Foster et al. (2017).

2.2 Data Visualization in R

R programming language (R Core Team, 2018) was used for spatial data visualization using global informational system with known latitudes and longitudes. These maps include spatial distribution of MAP, compiled $\delta^{13}C$ value of C_3 land plants, and the computed $\Delta^{13}C$ from year 1980 to 2018 (Figs. 2-4), and through the Quaternary (Figs. 6-7 and 10-11). R function "Tidyverse" was used to organize the data and packages used to plot the data were ggplot2

(Hadley et al., 2018), and ggmap (Kahle & Wickham, 2013), plotbiomes, tidyverse. Compiled data for 'Modern' (n = 686) and the 'Quaternary' (n = 1188) periods were processed and analyzed in R and JMP software.

2.3 Multiple-regression Analysis

The statistical software JMP was used for multiple-regression analysis in order to understand the MAP and pCO_2 effects on C_3 land plant carbon isotope fractionation. Prior to multi-regression analysis, all of the compiled modern data (n = 686) were used to perform linear regressions for MAP vs. $\Delta^{13}C$, altitude vs. $\Delta^{13}C$, MAT vs. $\Delta^{13}C$ and pCO_2 vs. $\Delta^{13}C$. The statistical significance was evaluated through the p-values and the correlation coefficient (r^2). All of the data were tested for normality using a Kruskal-Wallis T test.

3. RESULTS

3.1 Modern Compilation and Data Visualization of Stable isotopes of C_3 Plants

A total of 686 data points of modern C_3 land plants from the published literature were assembled across latitudes from 55 ^{o}N and 70 ^{o}S, and longitudes from 156 ^{o}W to 154 ^{o}E as shown in Figures 2, 3 and 4. The $\delta^{13}C$ values of the C_3 land plants range from -32‰ to -22‰ with an average value of -26.7‰ and a median value of -26.6 ‰ (Fig. 1). Fig. 1 represents the frequency distribution of modern $\delta^{13}C$ across the C_3 land plants.

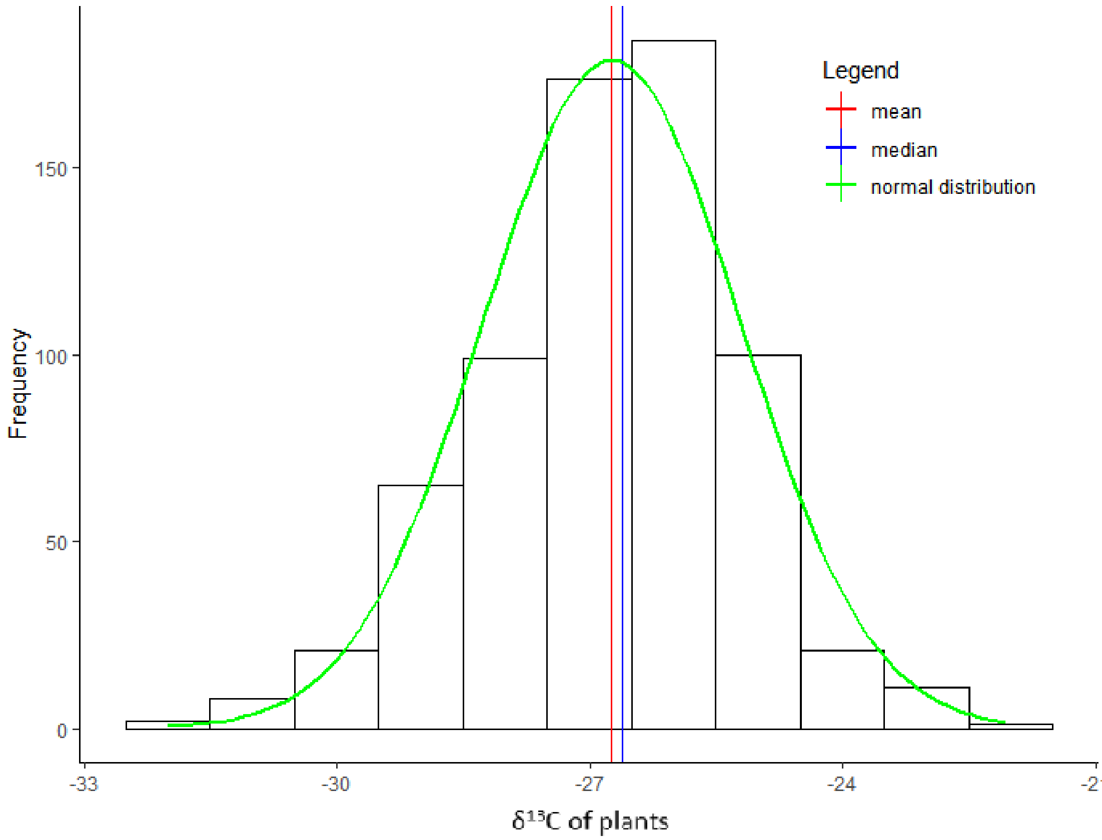

Figure 1. Histogram of modern carbon isotope values (*n* = 686)

Global distribution of $\delta^{13}C$ values of C_3 land plants, MAP, and $\Delta^{13}C$ records of the modern dataset (year 1980 to 2018) are shown in Figures 2, 3 and 4, which provide data visualization and spatial correlations between environmental controls and $\Delta^{13}C$ on all continents. The global $\delta^{13}C$ dataset show a significant gap in high latitudes and tropical regions (Fig. 2). MAP ranges from 1 mm to 4000 mm, with the highest values seen in tropical and coastal regions such as Japan, Indonesia and Cameroon. In continental and mid-latitude interiors, MAP values are lower than other areas (Fig. 3). $\Delta^{13}C$ values range from 14‰ to 25‰ and show similar patterns to the MAP records.

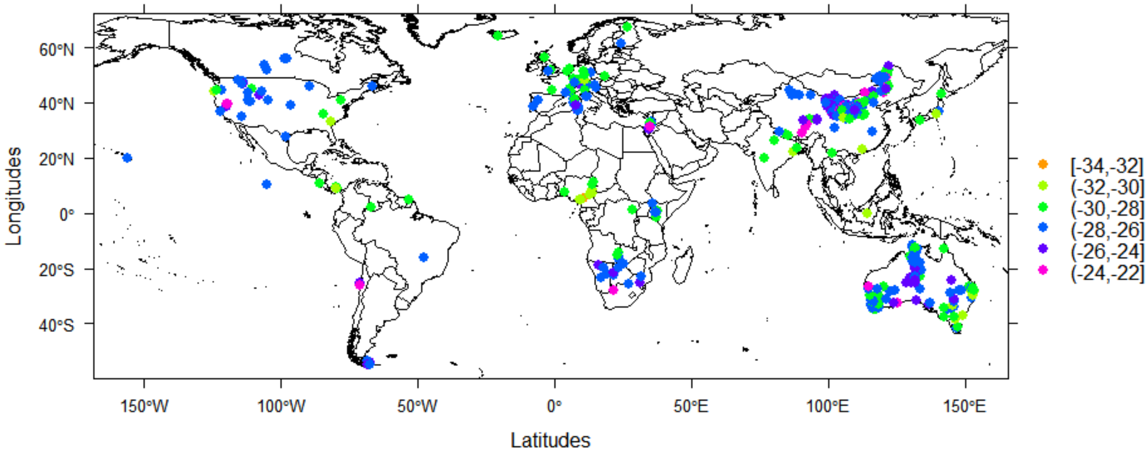

Figure 2. Spatial distribution of modern $\delta^{13}C$ from 1980 to the present (‰)

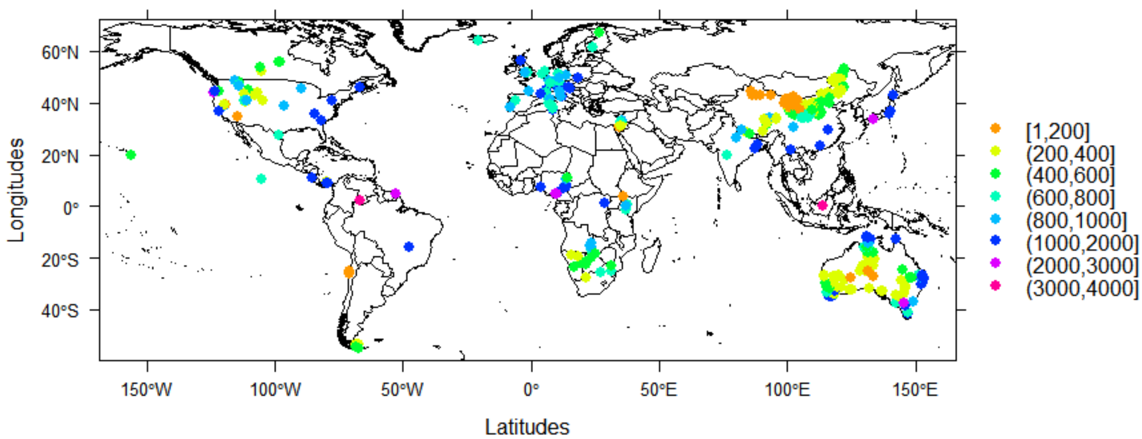

Figure 3. Spatial distribution of modern mean annual precipitation (MAP) from 1980 to the present (mm yr^{-1})

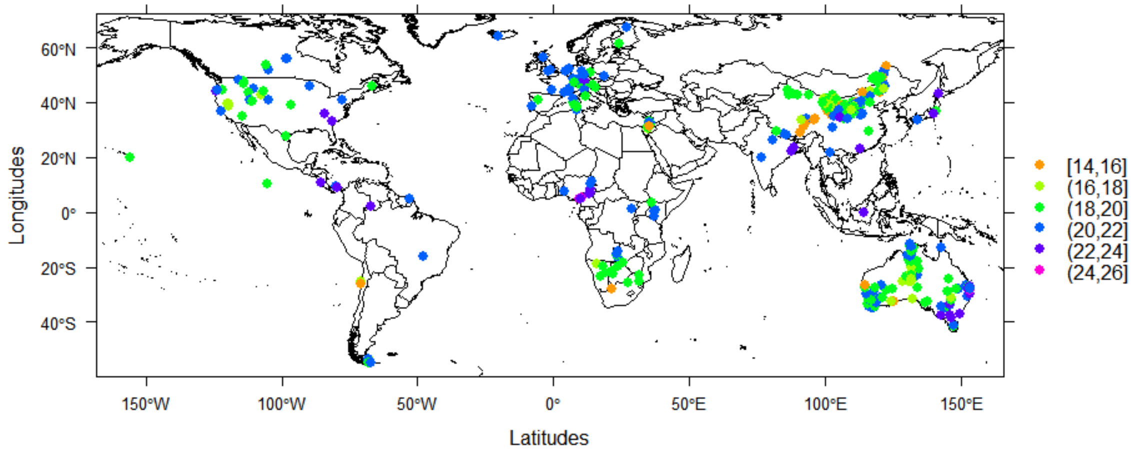

Figure 4. Spatial distribution of modern carbon isotope fractionation ($\Delta^{13}C$) from 1980 to the present

3.2 Quaternary $\delta^{13}C$ of C_3 Land Plants

A total of 1188 $\delta^{13}C$ values of bone collagen, tooth enamel and sedimentary organic matter of Quaternary age were compiled from literature to infer the $\delta^{13}C$ values of C_3 land plants. These records span latitudes from 37 ^oN and 76 ^oS, and longitudes from 150 ^oW to 172 ^oE as shown in Fig. 5. The $\delta^{13}C$ values of the C_3 land plants range from -31.7‰ to -19.0‰ with an average value of -25.6‰ (Fig. 5 and Table 3), similar to the modern mean with a slightly wider range. Likewise, after accounting for changes in $\delta^{13}C$ of atmospheric CO_2 in the Quaternary, the $\Delta^{13}C$ values range from 12.8‰ to 26.7‰, slightly wider than the modern range (12 to 25‰).

Table 1. Animal species, material and the fractionation factor used in the Quaternary (0-2.58 Ma)

Animal Species	Common Names	Browsers/grazers	Materials analyzed for $\delta^{13}C$	Fractionation factor (‰)
Gigantopithecus blacki	Prehistoric apes	Mixed diet	Tooth Enamel	5

Bison	Buffalo	Grazers	Tooth Enamel	14.5
Ovibos moschatus	Musk ox	Grazers	Bone collagen	5
Tapirus	Tapir	Browsers	Tooth Enamel	14
Teleoceras	Rhinos	Browsers	Tooth Enamel	14
Tayassudae	Peccary	Browsers	Tooth Enamel	14.5
Stephanorhinus	Rhinoceros	Both	Bone collagen	5
Canis	Wolves, Coyotes, and Dogs	Both	Tooth Enamel	14.5
Equus	Horses	Grazers	Tooth Enamel	14.5
Rupicapra	Goat-antelope	Browsers	Tooth Enamel	14.5
Lama/Vicugna	Camel	Browsers	Bone collagen	5
Pongo	Orangutan	Browsers	Tooth Enamel	14
Bibos/Bos	Oxen	Grazers	Tooth Enamel	14
Cerf/Cervus/Capreolus /Megaloceros	Deer	Browsers	Bone collagen	5
Dama	Fallow deer	Browsers	Tooth Enamel	14.5
Vulpes	Red fox	Grazers	Tooth Enamel	14.5
Capra	Iberian ibex	Both	Tooth Enamel	14.5
Palaeoloxodon	Elephant	Both	Bone collagen	5
Hemitragus	Wild goat	Browsers	Tooth Enamel	14.5
Homo	Human	Mixed diet	Tooth Enamel	14.5

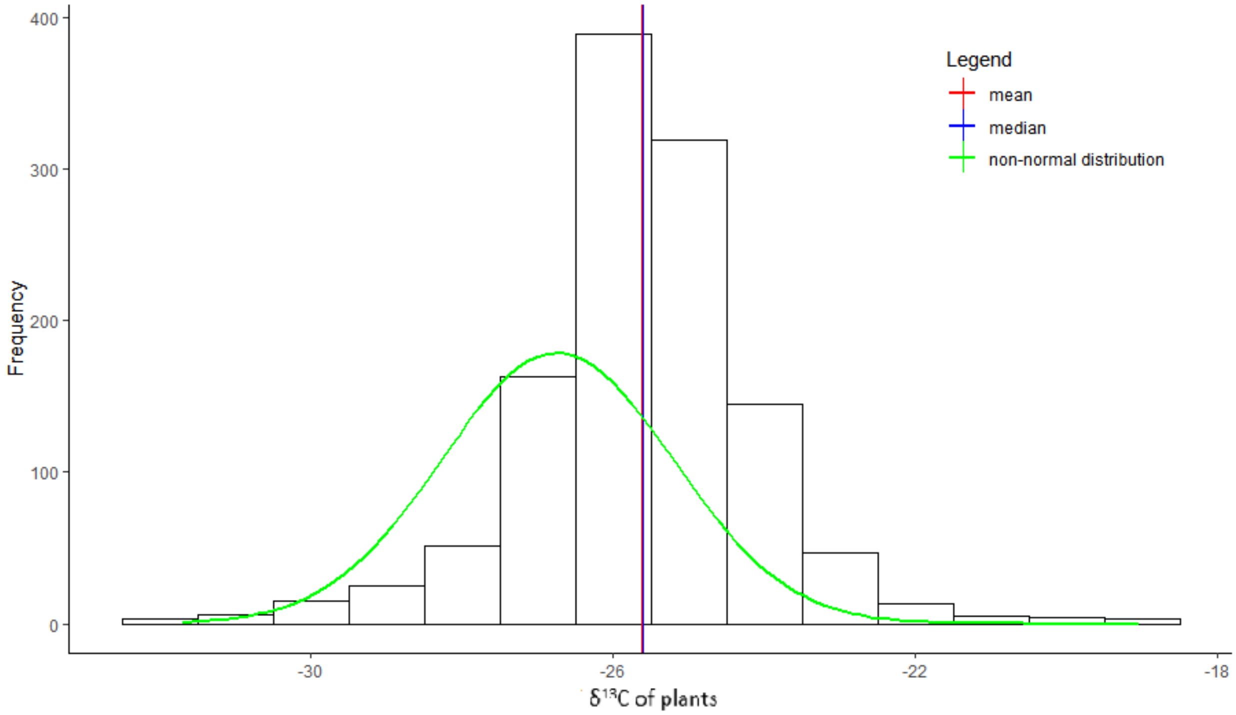

Figure 5. Histogram of the Quaternary $\delta^{13}C$ values of C_3 land plants (n = 1188)

The $\delta^{13}C$ and $\Delta^{13}C$ values of C_3 land plants of the Quaternary (2.58 million years ago to the present) are shown in Figs. 6 and 7. The Quaternary $\delta^{13}C$ dataset are limited to smaller area, mostly in the northern hemisphere. Unfortunately, there is no Quaternary $\delta^{13}C$ data in Africa and Australia, which begs for strong needs to obtain additional data in these regions in the future.

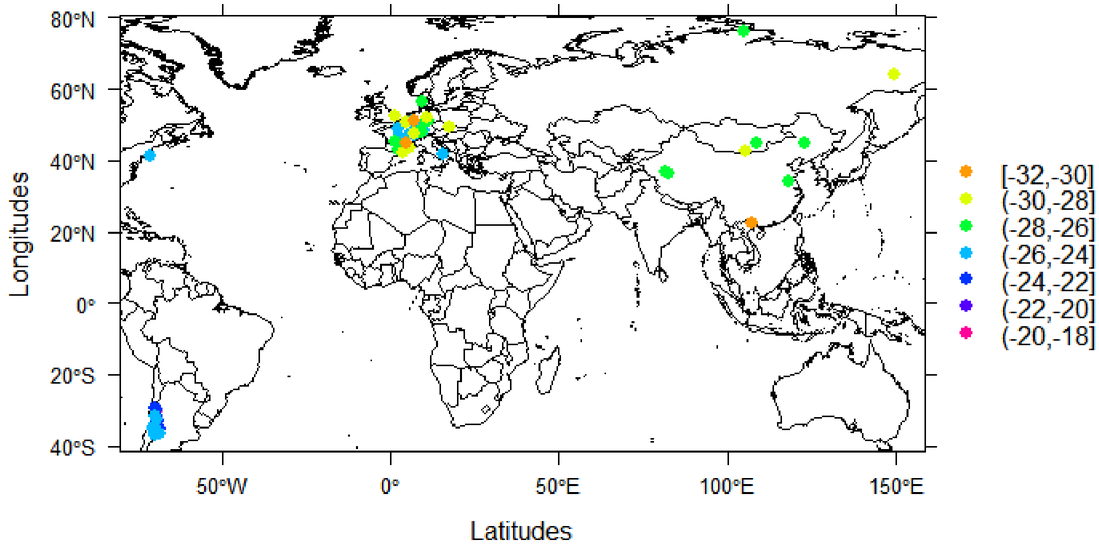

Figure 6. Spatial distribution of $\delta^{13}C$ of C_3 land plants in the Quaternary (‰)

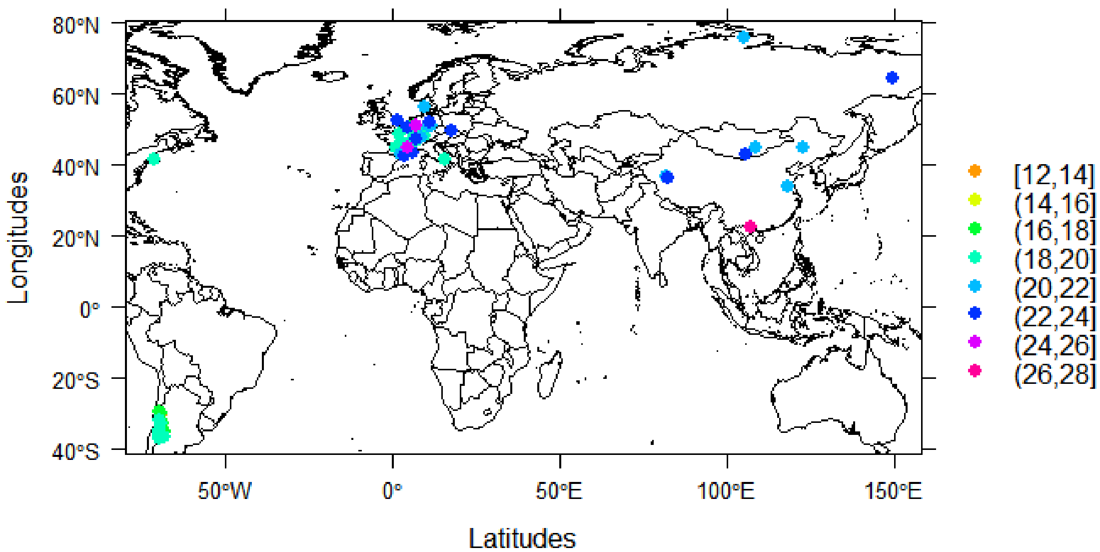

Figure 7. Spatial distribution of carbon isotope fractionation ($\Delta^{13}C$) between C_3 land plants and atmospheric CO_2 in the Quaternary (‰)

3.3 Statistical Results

To understand the environmental controls on carbon isotope fractionation, linear regression and multiple-regression were used to evaluate the role of MAP, atmospheric pCO_2, latitude, altitude, and MAT. The highest correlation coefficient is between $\Delta^{13}C$ and MAP (r^2 = 0.39, n = 686), followed by Log $_{10}$(MAP) (r^2 = 0.3, n = 686), MAT (r^2 = 0.15, n = 684), pCO_2 (r^2 = 0.08, n = 684), altitude (r^2 = 0.07, n = 562), and latitude (r^2 = 0.04, n = 686) (Table 2).

Table 2. Linear regression of $\Delta^{13}C$ with environmental variables, including MAP, latitude, pCO_2, altitude and MAT

Environmental Variables	$\mathbf{R^2}$	**Intercept**	**Slope**	***p*-value**	**Numbers of data**
MAP	0.39	17.91	0.002	<0.0001	686
Log_{10}(MAP)	0.30	12.65	2.46	<0.0001	686
MAT	0.15	18.54	0.07	<0.0001	684
pCO_2	0.08	33.73	-0.04	<0.0001	684
Altitude	0.07	19.88	-0.0003	<0.0001	562
Latitude	0.14	19.38	-0.012	<0.0001	686

Multi-regression analysis shows that the spatial relationship between the carbon isotopes of C_3 land plants and the MAP is well represented by a negative correlation (r^2 = 0.36; slope = -0.002, intercept = -25.6). A logarithmic MAP shows weaker correlation compared to linear MAP, contrasting the results of Diefendorf et al. (2010), Kohn (2010) and Basu et al. (2019). As Fig. 3 shows, in environments that are characterized by MAP lower than 1000 mm yr^{-1} (e.g., subtropical deserts and temperature grassland/desert), it is expected that the $\Delta^{13}C$ should increase as MAP goes up, at a rate faster than in wetter environment such as the tropical rainforest. In the studied range of pCO_2 (320 to 410 ppm), there is a weak but significant negative relationship between $\Delta^{13}C$ and pCO_2 (r^2 = 0.08, slope = -0.038, intercept = 33.73). The MAT also shows strong positive relationship with $\Delta^{13}C$ (r^2 = 0.15), consistent with research that sampled plants along a 400 mm yr^{-1} MAP isoline (Wang et al., 2013).

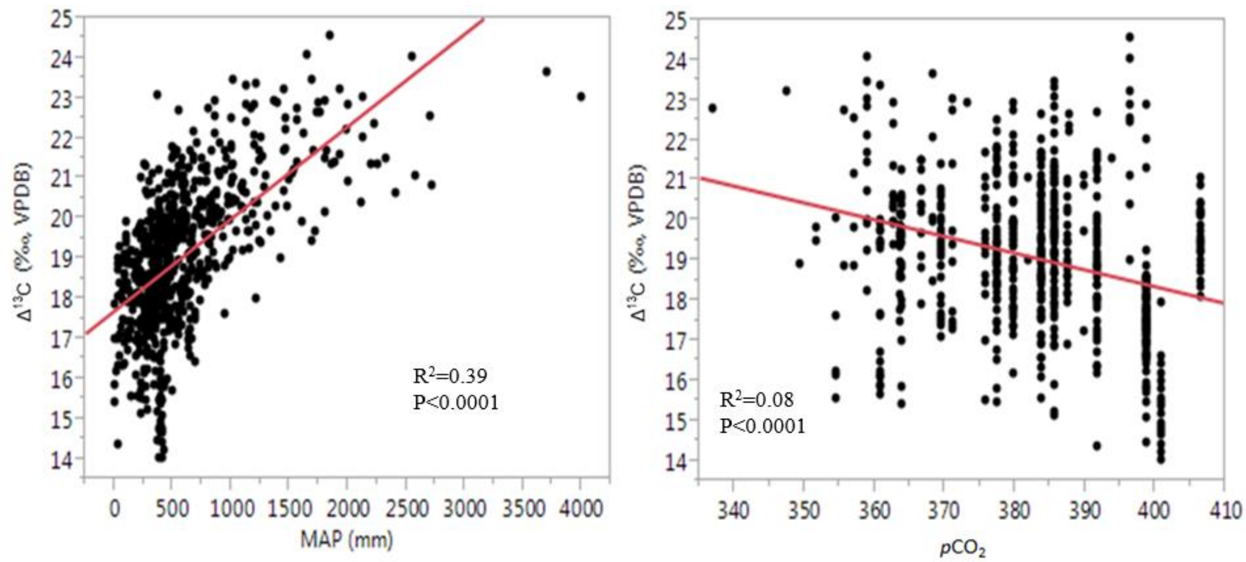

Figure 8. Linear regression from the total number of datasets between carbon isotope fractionation ($\Delta^{13}C$) vs MAP (Left), and carbon isotope fractionation ($\Delta^{13}C$) vs pCO_2 (Right)

Most of the modern plants in this study are angiosperms (n = 600), with a small amount of gymnosperm (n = 20) and a mixture of both angiosperm and gymnosperm (n = 66). Typically, the $\delta^{13}C$ values of angiosperms are slightly more depleted than gymnosperms, likely due to their different isotopic fractionation processes (Diefendorf & Freimuth, 2017). Such difference is also observed in our dataset, with angiosperm being ~1‰ more depleted than gymnosperm in the modern C_3 land plants (Fig. 9 and Table 3).

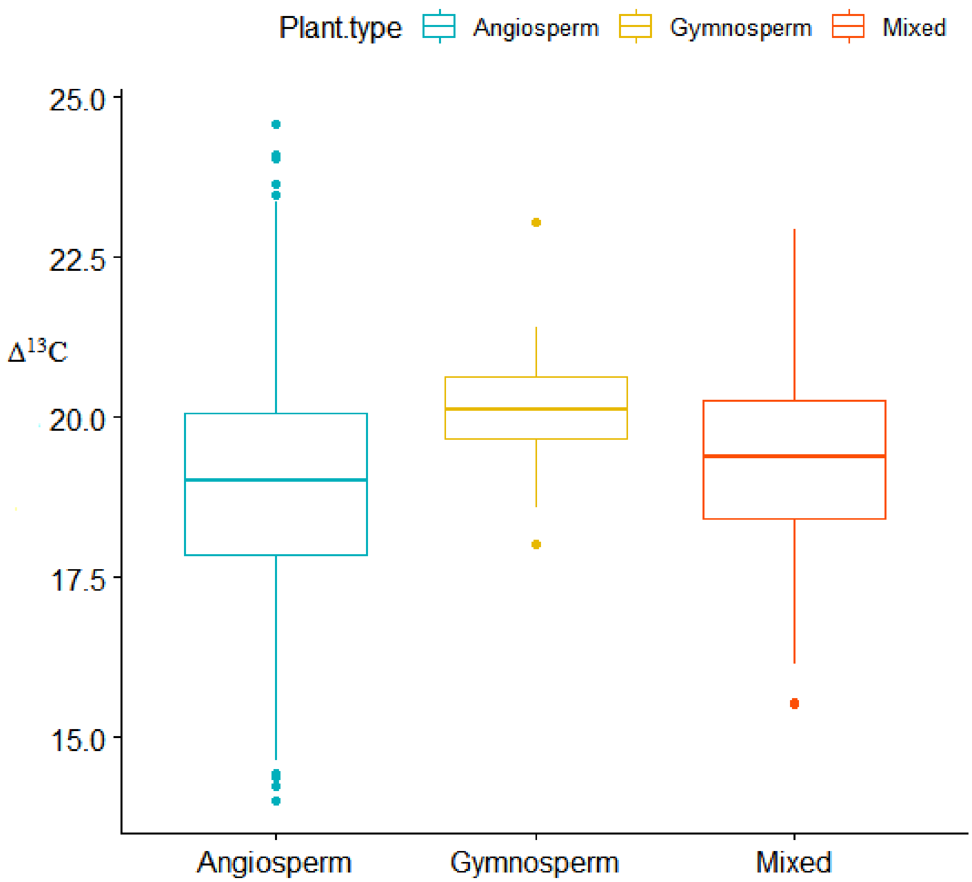

Figure 9. Carbon isotope fractionation values based on plant types

Table 3. Summary statistics of carbon isotope fractionation values for plant types

Plant type	**Count**	**Mean**	**Sd**	**Median**	**IQR**
Angiosperm	600	19.2	1.83	19.2	2.34
Gymnosperm	20	20.1	1.11	20.1	0.973
Mixed	66	19.3	1.55	19.4	1.85

Multi-regression analysis suggests that while holding global MAP constant, pCO_2 exerts a negative control on $\Delta^{13}C$ (Eq. 2).

$$\Delta^{13}C = 25.1 + (0.002) * \text{MAP (mm yr}^{-1}) - (0.018) * pCO_2\ (n = 686, r^2 = 0.40, p \text{ value} < 0.001)$$

(Equation 2)

Adding atmospheric pCO_2 in the linear MAP regression improved the r^2 from 0.36 to 0.4 (Eq. 2) and both MAP and pCO_2 showed statistical significance. This improvement in the correlation coefficient may allow for more accurate and precise reconstruction of atmospheric pCO_2 if MAP is known independently. It is, however, possible that regional MAP may play a more important role in controlling the $\Delta^{13}C$ as suggested by Basu et al. (2019). To test this idea, multi-regression at each continent was performed to evaluate region-specific relationship between two key variables, MAP and atmospheric pCO_2. Interestingly, Asia is the only continent that shows strong statistically significant correlation between $\Delta^{13}C$, MAP and atmospheric pCO_2 ($r^2 = 0.22$, p value < 0.01)

Table 4. Multi-regression in each continent

Continents	**R^2**	**Intercept**	**Slope (MAP)**	**Slope (pCO_2)**	***p*-value with MAP**	***p*-value with pCO_2**	**Numbers of data**
Africa	0.64	18.28	0.002	$-7.61e^{-5}$	<0.01	1	35
Asia	0.22	26.26	0.002	-0.02	<0.01	<0.01	389
Europe	0.12	23.56	0.001	-0.01	0.5	0.02	81
North America	0.4	14.76	0.002	0.008	<0.01	0.6	47
Oceania	0.42	10.32	0.002	0.02	<0.01	0.09	121
Latitude	0.55	-10.79	0.002	0.08	0.02	0.35	11

Using the multi-regression equation developed in this study (Eq. 2), pCO_2 is reconstructed for the Quaternary Period. The sites used to reconstruct pCO_2 are across latitudes from 30 ^oN and 80 ^oN, and longitudes from 80 ^oW to 160 ^oE (Fig. 12). The reconstructed pCO_2 values fluctuate between 0 to 700 ppm and correspond to the ice-core records in the last 800 kyr (Fig. 14).

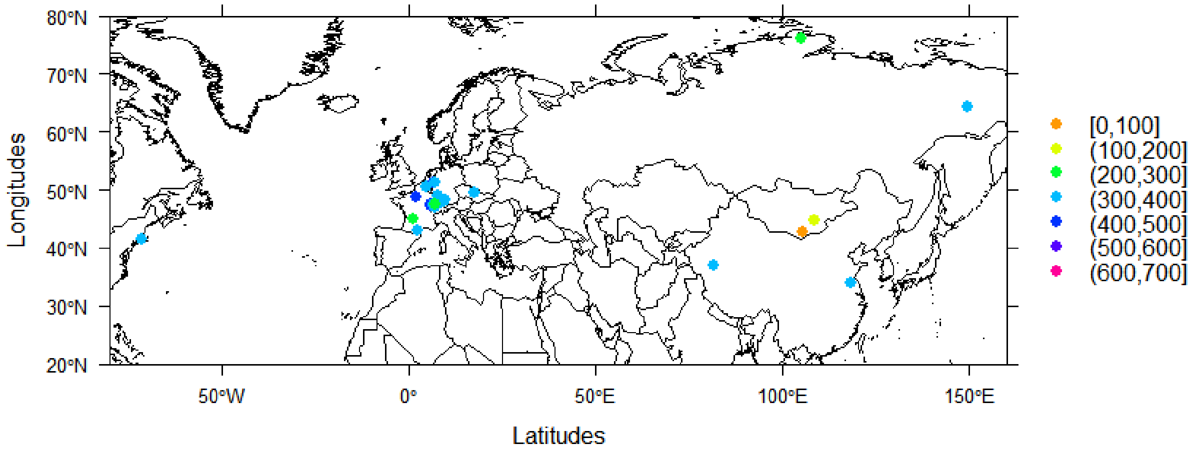

Figure 10. Spatial distribution of the reconstructed atmospheric pCO_2 for the Quaternary at times when sedimentary carbon isotope data are available

Because of the good agreement between the ice core records and our reconstructed atmospheric pCO_2, it is possible that MAP can be reconstructed at any time in the geological past if atmospheric pCO_2 is independently known with accountable uncertainty. To test this hypothesis, we calculated MAP across latitudes from 0 ^{o}N and 80 ^{o}N (data only available in the northern hemisphere), and across longitudes from 0 ^{o}E to 160 ^{o}E. The reconstructed MAP values range from 0 to 4000 mm yr^{-1}, broadly consistent with MAP from independent evidence from flora records (Figure 13). The difference between the median of the reconstructed MAP and the median MAP is less than 650 mm yr^{-1}.

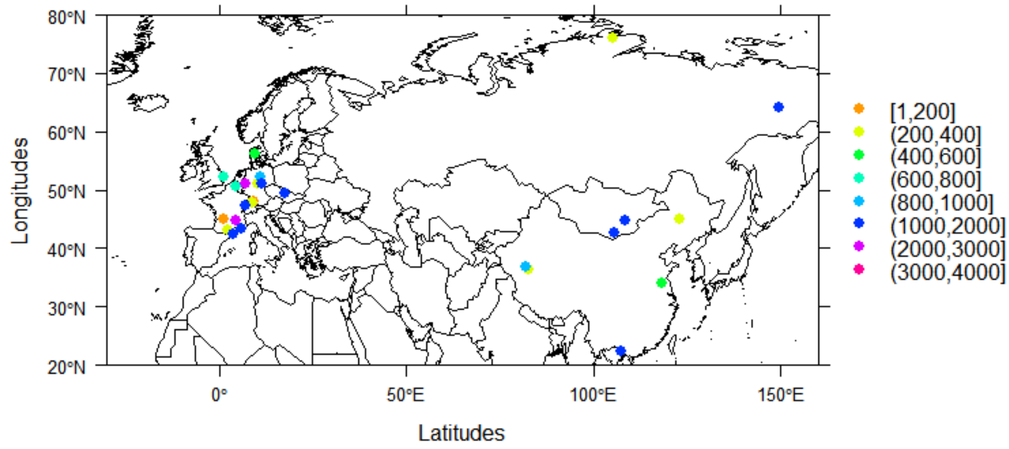

Figure 11. Spatial visualization of our reconstructed MAP in the Quaternary (mm yr^{-1})

4. DISCUSSION

4.1 Climatic Controls on Stable Carbon Isotope Fractionation of Modern C_3 Land Plants

Stable carbon isotope fractionation ($\Delta^{13}C$) of C_3 land plant is known to be affected by several climatic variables, including MAP, MAT, pCO_2, latitude, and altitude (Kohn, 2010; Diefendorf et al., 2010; Schubert & Jahren 2012; Basu et al., 2019; Wang et al., 2013). The correlation coefficient of multi-regression on the effects of MAP, MAT, latitude, altitude and pCO_2 show a higher value (r^2 = 0.39 vs. 0.37) compared to Basu et al. (2019), but slightly lower (r^2 = 0.39) compared to those reported in Diefendorf et al. (2010) (r^2 = 0.52) and Kohn (2010) (r^2 = 0.4). Such difference is likely because we treat the $\delta^{13}C$ data from a single site as ecosystem average and the additions of newly published data since 2010 (Table 2; Fig. 14).

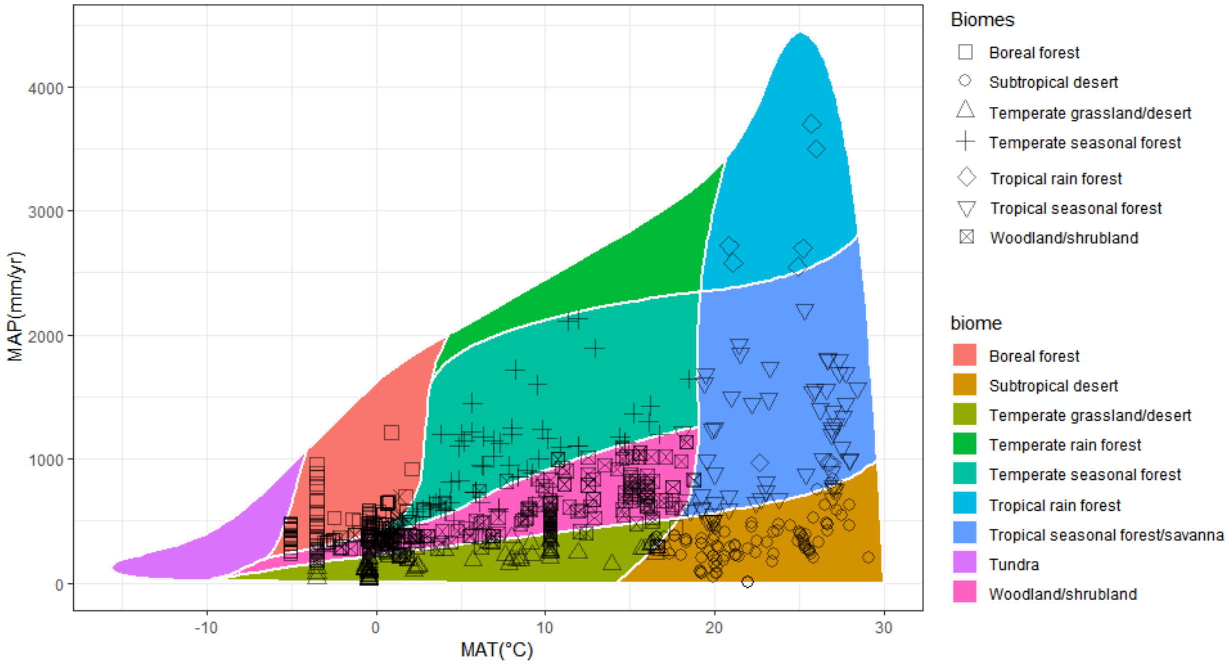

Figure 12. Global MAP and MAT of the modern $\Delta^{13}C$ dataset separated by biome types defined by Ricklefs (2008)

Fig. 12 represents the Whittaker biome distribution of the modern dataset based on their MAP and MAT values. The modern dataset includes all biomes (boreal forest, subtropical desert, temperate grassland/desert, temperate seasonal forest, tropical rain forest, tropical seasonal forest/savanna, and woodland/shrubland) except for tundra and temperate rainforest (Fig. 12). The lack of data in tundra, temperate rain forest, and tropical rain forest environment is because most of the plants from the modern dataset are angiosperms (n = 600) which do not grow in these environments. A majority of the data (>85%) are associated with low MAP values (less than 1000 mm yr^{-1}), suggesting the regression established using this dataset may have been biased (Fig. 13).

4.2 MAP and *p*CO_2 effects on $\Delta^{13}C$

Several studies have investigated the effects of MAP on $\Delta^{13}C$ (Kohn, 2010; Diefendorf et al., 2010; Diefendorf & Freimuth, 2017; Basu et al, 2019). Strong positive correlation between $\Delta^{13}C$ and MAP is found in all previous studies and this study (Fig. 13). These studies show that for MAP lower than 1000 mm yr^{-1}, rate of change in $\Delta^{13}C$ is faster compared to MAP higher than 1000 mm yr^{-1}, suggesting the sensitivity of MAP effects becomes smaller in wet regions. This pattern is best explained by the relationship of carbon fixation to water-use efficiency. Limitations in stomata structure result in decreasing plant performance with increasing water availability (Zhang et al., 2019).

In addition to the MAP effects on $\Delta^{13}C$, atmospheric pCO_2 has also been regarded as a significant controlling factor on $\Delta^{13}C$ based on growth chamber experiments and field observations (Schubert & Jahren, 2012, 2015; Cui & Schubert 2016, 2017, 2018; Dal Corso et al., 2017; Hare et al., 2018; Basu et al., 2019). Schubert and Jahren (2012) showed that $\Delta^{13}C$ respond as a hyperbolic function as pCO_2 increases from experimental C_3 plant carbon isotope data collected from plants grown in chambers across fifteen pCO_2 conditions. They also showed that reconstructed pCO_2 levels of the past 30 kyr from $\Delta^{13}C$ data agree with the ice core data (Schubert & Jahren, 2015). Porter et al. (2019) combined Schubert and Jahren (2012)'s study with a mechanistical model using stomatal anatomy measurements to confirm that pCO_2 can be accurately estimated using these methods.

Few studies, however, have attempted to understand the joint effects of MAP and pCO_2 on $\Delta^{13}C$. Kohn (2016) developed a multi-regression that accounts for both MAP and pCO_2, but found that the effect of pCO_2 on $\Delta^{13}C$ is negative but insignificant (Eq. 3; $p > 0.026$).

$$\Delta^{13}C = 6.35 - 1.80e^{-4} \times \text{Elevation (m)} + 5.84 \times \log(\text{MAP}-300, \text{mm yr}^{-1}) + 0.014 \times \text{Abs (latitude, }^{o}) - 0.012 \times pCO_2 \text{ (Equation 3)}$$

In contrast to the finding of the insignificant effect of pCO_2 on $\Delta^{13}C$ of Kohn (2016), we find that the small negative relationship between pCO_2 and $\Delta^{13}C$ is statistically significant. This negative correlation between pCO_2 and $\Delta^{13}C$ for the pCO_2 range studied (380 to 410 ppm) is inconsistent with the general hyperbolic relationship established by Schubert and Jahren (2012) for pCO_2 from 280 to 4000 ppm. This can be explained by the experimental work by Zhang et al. (2018) who demonstrated a large negative effect (1.5‰ decrease in $\Delta^{13}C$ per 100 ppm increases in pCO_2 for n-C_{29} alkane and 0.6‰ decrease in $\Delta^{13}C$ per 100 ppm increases in pCO_2 for cellulose) using winter wheat (*Triticum aestivum*) that grown under 170 to 400 ppm pCO_2. The negative pCO_2 effects on carbon isotope fractionation is suggested to be due to higher stomatal conductance (g_s) which may have driven increases in carbon isotope fractionation under low CO_2 conditions (Zhang et al., 2018; Franks and Beerling, 2009). These studies suggest that the relationship between pCO_2 and $\Delta^{13}C$ may have been U-shaped for pCO_2 ranging from 170 to 4000 ppm, and yet to be confirmed by further experimental studies that span a wider range of pCO_2 conditions. Despite these limitations, our multi-regression curve reveals a statistically significant relationship between pCO_2 and $\Delta^{13}C$ after accounting for changes in MAP and other environmental factors, offering important potentials for more precise reconstruction in atmospheric pCO_2 in the geologic past.

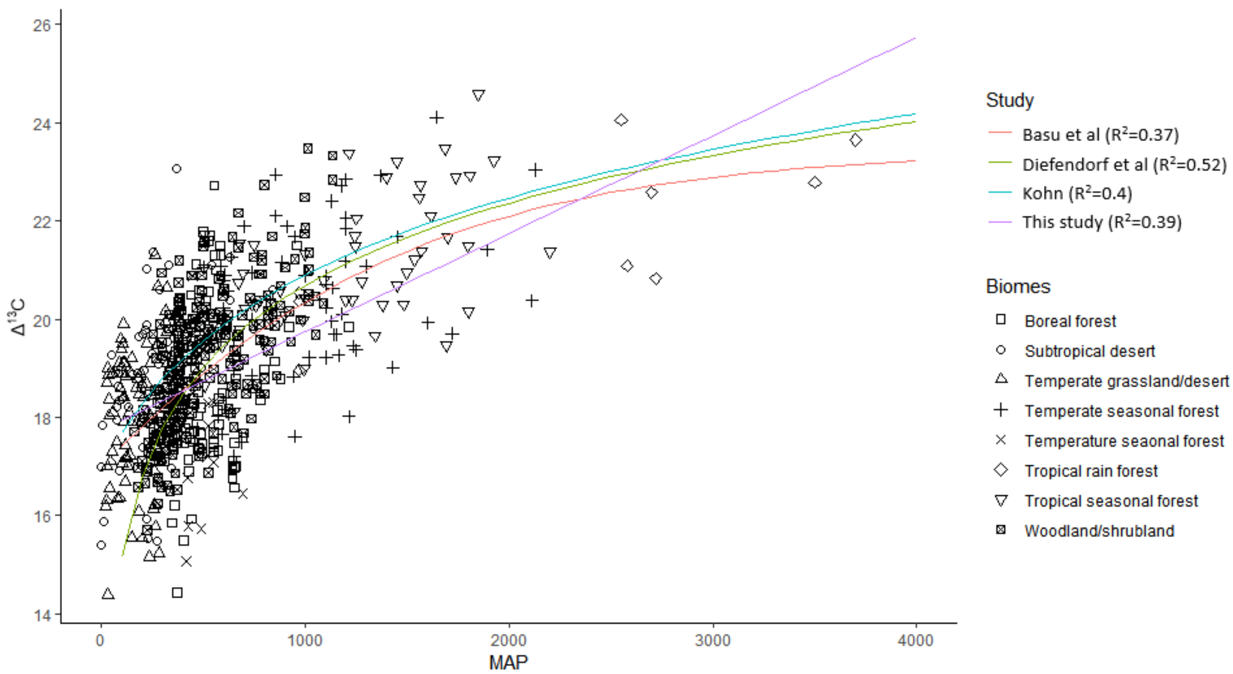

Figure 13. Comparison of the relationship between carbon isotope fractionation and MAP

4.3 Quaternary atmospheric CO_2 levels

Ice-core records provide atmospheric pCO_2 for the last 800,000 years. In addition, a number of proxies exist to infer past pCO_2 records in the Quaternary. These widely used proxies include leaf stomata index, boron isotopes and alkenone extracted from phytoplankton (Foster et al., 2017; Beering et al., 2009). Our newly calculated pCO_2 based on Quaternary sedimentary records (bone collagen, tooth enamel and fossil organic matter) is compared with the pCO_2 from ice-core records (Lüthi, 2008) and proxies as reported in Foster et al. (2017) (Fig. 14). The degree to which the accuracy of this approach to reconstruct atmospheric pCO_2 can be assessed using a subset of compiled Quaternary data where MAP can be accounted for before the pCO_2 effects can be applied. We note that the reconstructed CO_2 values are broadly consistent with the ice core pCO_2 records, and the difference between median of ice core records and the median

pCO_2 estimates is less than 220 ppm across all values for a given time. Such a difference is expected because the reconstructed *p*CO2 records are calculated from a global composite across a range of modern timescale that is not specific to the Quaternary time period.

CO_2 has risen rapidly in recent years through fossil fuel exploitation following the industrial revolution (Le Quéré et al., 2017). pCO_2 fluctuates between 180 and 280 ppm within a series of glacial and inter-glacial cycles in the Quaternary (Olago et al., 1999; Sheldon, 2006). Large uncertainties exist for several proxies to reconstruct CO_2 in the past, begging for urgent need to refine the proxy approach to reduce uncertainty and improve accuracy and precision of the reconstructed pCO_2. The Quaternary has rich dataset in $\Delta^{13}C$ from sedimentary organic matter, regional temperature and precipitation as well as atmospheric pCO_2 in the last 800 kyr. As is shown in Fig. 14, spikes in the highest CO_2 concentrations often coincide with interglacial events, while lowest CO_2 concentrations precedes the onset of glaciation. These geologically abrupt changes in pCO_2 are predominantly controlled by Milankovitch cycles, which are related to the Earth’s tilt or orbit. The climate response to such CO_2 forcing is that some greenhouse gases, most notably atmospheric CO_2 can amplify the fluctuations in global temperature (Hansen et al., 2013).

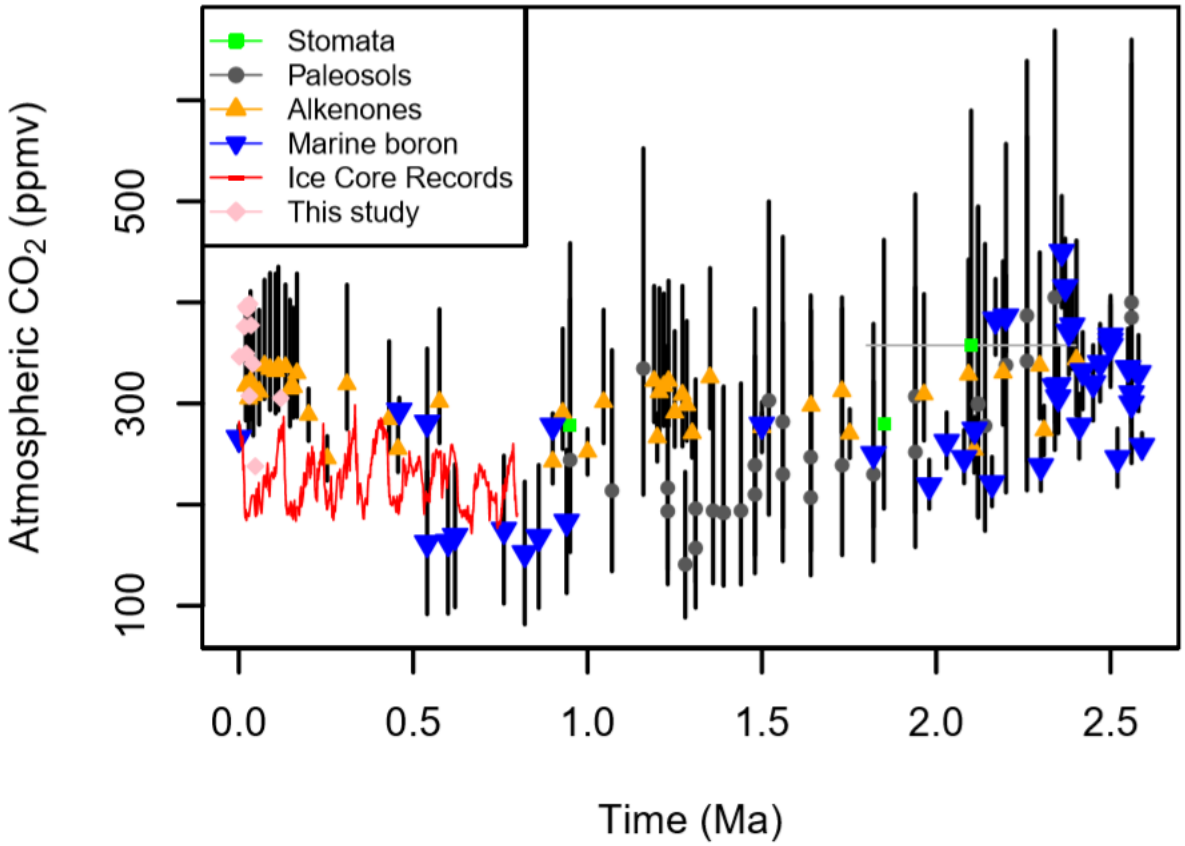

Figure 14. Ice core records for the last 800,000 years and various proxies from Foster et al. (2017) in the Quaternary

5. CONCLUSION

This is the first study to understand the joint effects of MAP and pCO_2 on carbon isotope fractionation of C_3 land plants ($\Delta^{13}C$) in modern environment and the first application of such effect to reconstruct atmospheric pCO_2 in the Quaternary (2.58 Ma to present). The results reveal a statistically significant positive correlation between MAP and $\Delta^{13}C$ (slope = 0.002, $r^2 = 0.39$) and a negative correlation between pCO_2 and $\Delta^{13}C$ (slope = -0.04, $r^2 = 0.08$), which provides evidence for accounting for changes in MAP in order to reconstruct more precise and accurate pCO_2 in the geologic past. This new approach is founded on the long observation that $\Delta^{13}C$ of C_3

land plants is affected by stomatal conductance, which is related to changes in water availability or MAP in the growing environments and that the $\Delta^{13}C$ is also affected by atmospheric pCO_2, although the direction of such effects can be both positive and negative, depending on the range of studied pCO_2.The degree to which the uncertainty of pCO_2 reconstruction can be improved is assessed by using a subset of fossil $\Delta^{13}C$ data with known MAP, using a multi-regression relationship developed from a large modern dataset. We note that the empirical relationship better accounts for the changes in MAP before a pCO_2 effect is applied, and the reconstructed Quaternary pCO_2 is broadly consistent with the ice-core and proxy records.

Future research is needed to show how much uncertainty can be reduced by accounting for changes in MAP can in order to obtain more precise and accurate pCO_2 estimates in geological records. Our results suggest that pCO_2 can be more reliably estimated based on empirical relationship between MAP, pCO_2, and $\Delta^{13}C$. Understanding past changes in pCO_2 with reduced uncertainty can help understand the effects of anthropogenic CO_2 emissions in future climate change. Furthermore, the multi-regression equation used in this study may provide insight to analyze other geologic time periods as well by using available MAP records in order to reduce the uncertainty of atmospheric pCO_2 reconstruction.

APPENDIX

Table 1

Modern Compilation

References	Location	Country	Latitude	Longitude	MAP (mm)	$\delta^{13}C_{plant}$ (‰, VPDB)	Long-chain n-alkane	$\delta^{13}C_{air}$ (‰, VPDB)	$\Delta^{13}C$ (‰, VPDB)	Temperature (°C)	Altitude (m)	pCO_2	Plant type
Ale et al., 2018	Langtang	Nepal	28.07391	85.42537	443	-27.99	-32.99	-8.7	19.84547484	0.02	4650	406.55	Angiosperm
Ale et al., 2018	Langtang	Nepal	28.07391	85.42537	443	-26.32	-31.32	-8.7	18.09629447	0.02	4650	406.55	Angiosperm
Ale et al., 2018	Langtang	Nepal	28.07727	85.42234	469	-27.59	-32.59	-8.7	19.4259623	0.32	4600	406.55	Angiosperm
Ale et al., 2018	Langtang	Nepal	28.07727	85.42234	469	-27.51	-32.51	-8.7	19.3421012	0.32	4600	406.55	Angiosperm
Ale et al., 2018	Manang	Nepal	28.66616	84.49606	383	-28.56	-33.56	-8.7	20.44387713	0.44	4600	406.55	Angiosperm
Ale et al., 2018	Langtang	Nepal	28.0817	85.41974	469	-28.37	-33.37	-8.7	20.24433169	0.58	4550	406.55	Angiosperm
Ale et al., 2018	Langtang	Nepal	28.0817	85.41974	469	-27.36	-32.36	-8.7	19.18489883	0.58	4550	406.55	Angiosperm
Ale et al., 2018	Manang	Nepal	28.66676	84.4947	378	-27.75	-32.75	-8.7	19.59372589	0.77	4550	406.55	Angiosperm
Ale et al., 2018	Langtang	Nepal	28.08184	85.41885	469	-28.01	-33.01	-8.7	19.86645953	0.84	4500	406.55	Angiosperm
Ale et al., 2018	Langtang	Nepal	28.08184	85.41885	469	-27.21	-32.21	-8.7	19.02774494	0.84	4500	406.55	Angiosperm
Ale et al., 2018	Manang	Nepal	28.66644	84.49345	383	-28.39	-33.39	-8.7	20.2653328	0.96	4500	406.55	Angiosperm
Ale et al., 2018	Manang	Nepal	28.66489	84.49214	383	-28.53	-33.53	-8.7	20.41236477	1.07	4480	406.55	Angiosperm
Ale et al., 2018	Manang	Nepal	28.66489	84.49214	383	-27.99	-32.99	-8.7	19.84547484	1.07	4480	406.55	Angiosperm
Ale et al., 2018	Langtang	Nepal	28.08405	85.41505	447	-28.97	-33.97	-8.7	20.87474125	1.34	4400	406.55	Angiosperm

Ale et al., 2018	Langtang	Nepal	28.08405	85.41505	447	-26.69	-31.69	-8.7	18.48331981	1.34	4400	406.55	Angiosperm
Ale et al., 2018	Manang	Nepal	28.6632	84.48971	378	-27.41	-32.41	-8.7	19.23729423	1.44	4430	406.55	Angiosperm
Ale et al., 2018	Manang	Nepal	28.66179	84.48653	378	-27.62	-32.62	-8.7	19.45741377	1.69	4371	406.55	Angiosperm
Ale et al., 2018	Langtang	Nepal	28.08388	85.39813	494	-28.32	-33.32	-8.7	20.1918327	1.91	4300	406.55	Angiosperm
Ale et al., 2018	Langtang	Nepal	28.08388	85.39813	494	-28.99	-33.99	-8.7	20.89576832	1.91	4300	406.55	Angiosperm
Ale et al., 2018	Manang	Nepal	28.66059	84.48274	376	-27.86	-32.86	-8.7	19.7090954	2.09	4310	406.55	Angiosperm
Ale et al., 2018	Manang	Nepal	28.66059	84.48274	376	-26.55	-31.55	-8.7	18.33684319	2.09	4310	406.55	Angiosperm
Ale et al., 2018	Manang	Nepal	28.6597	84.48071	378	-26.91	-31.91	-8.7	18.71358251	2.29	4270	406.55	Angiosperm
Ale et al., 2018	Manang	Nepal	28.65714	84.47568	378	-27.64	-32.64	-8.7	19.47838249	2.29	4200	406.55	Angiosperm
Ale et al., 2018	Manang	Nepal	28.65945	84.4799	376	-27.054	-32.054	-8.7	18.8643563	2.4	4250	406.55	Angiosperm
Ale et al., 2018	Manang	Nepal	28.65714	84.47568	378	-28.25	-33.25	-8.7	20.1183432	2.77	4200	406.55	Angiosperm
Ale et al., 2018	Manang	Nepal	28.65635	84.47545	378	-28.28	-33.28	-8.7	20.1498374	3.02	4130	406.55	Angiosperm
Ale et al., 2018	Langtang	Nepal	28.09134	85.3823	605	-28.99	-33.99	-8.7	20.89576832	3.79	3950	406.55	Angiosperm
Ale et al., 2018	Langtang	Nepal	28.09255	85.38042	587	-29.17	-34.17	-8.7	21.08505094	4.06	3900	406.55	Angiosperm
Bai et al., 2008	Alice	USA	27.7	-98.2	680	-26.7	-31.7	-8.13	19.07942053	22.7	80	383.79	Angiosperm
Basu et al., 2015	Versa Ghat	India	22.3	87.3	1400	-30.4	-35.4	-8.2	22.8960396	26.2	29	398.65	Angiosperm
Basu et al., 2015	Kanpur	India	26.4	80.3	1000	-28.9	-33.9	-8.2	21.31603336	26.4	133	398.65	Angiosperm
Basu et al., 2015	Mohanpur	India	23.8	88.5	1250	-29.6	-34.6	-8.2	22.05276175	26.93	9.7	398.65	Angiosperm
Bowling et al., 2002	Florence	USA	44.11666667	-124.1166667	2129	-30.3	-35.3	-7.954	23.04424049	11.9	30	371.14	Gymnosperm
Bowling	Camp	USA	44.5	-	523	-27.15	-32.15	-7.954	19.73171	12.9	941	371.14	Gymnosp

et al., 2002	Sherman			121.6166667					609				erm
Bowling et al., 2002	Blodgett	USA	44.58333333	-123.5833333	1892	-28.75	-33.75	-7.954	21.41158301	12.9	290	371.14	Gymnosperm
Brooks et al., 1997	Mystery Lake	Canada	55.74666667	-97.85166667	513	-27.61318187	-32.61318187	-7.81	20.36553921	-1.4	200	362.61	Mixed
Brooks et al., 1997	Christopher Lake	Canada	53.5625	-105.75	420	-27.1755882	-32.1755882	-7.81	19.9065607	4.8	600	362.61	Mixed
Buchmann et al., 1997a	Sinnamary	France	5.033333333	-53	2200	-28.6	-33.6	-7.84	21.3712168	25.3	40	362.61	Angiosperm
Buchmann et al., 1997b	Kamas	USA	40.57	-111.33	224.14	-27.19	-32.19	-7.84	19.89083171	18	2400	362.61	Mixed
Buchmann et al., 1997b	Salt Lake City	USA	40.78	-111.7666667	600.24	-27.87	-32.87	-7.84	20.60424017	18	1700	362.61	Mixed
Buchmann et al., 1997b	Hanna	USA	40.65	-110.9	979.5	-27.28	-32.28	-7.84	19.98519615	18	2800	362.61	Mixed
Cerling & Harris, 1999	Río Grande	Argentina	-54.55	-68	500	-28.8	-33.8	-7.931	21.48785008	5.9	150	366.7	Angiosperm
Cerling & Harris, 1999	Río Grande	Argentina	-53.76666667	-67.45	330	-25.4	-30.4	-7.931	17.92427663	6.9	150	366.7	Angiosperm
Cerling & Harris, 1999	Río Grande	Argentina	-53.55	-68.15	380	-26.5	-31.5	-7.885	19.12172573	6.9	150	366.7	Angiosperm
Cerling & Harris, 1999	Río Grande	Argentina	-53.55	-68.15	380	-27.7	-32.7	-7.908	20.35585725	6.9	150	366.7	Angiosperm
Cerling	Río	Argentin	-53.6	-68.25	380	-27.8	-32.8	-7.632	20.74470	6.9	50	366.7	Angiospe

& Harris, 1999	Grande	a							274				rm
Cerling & Harris, 1999	Caniapiscau	Canada	-54.8	-68.25	530	-25.93333333	-30.93333333	-7.609	18.81219629	7.2	50	366.7	Angiosperm
Cerling & Harris, 1999	Subd. D	Canada	-54.88333333	-67.3	600	-27.25	-32.25	-7.586	20.21485479	7.2	10	366.7	Angiosperm
Cerling & Harris, 1999	Subd. D	Canada	-54.88333333	-67.3	600	-27.85	-32.85	-7.632	20.79720208	7.2	10	366.7	Angiosperm
Cerling & Harris, 1999	Machakos County	Kenya	-1.4	37	750	-28.85	-33.85	-7.954	21.51675848	27.1	1600	366.7	Angiosperm
Cerling & Harris, 1999	Laikipia County	Kenya	0.3	36.9	465	-27.1	-32.1	-7.931	19.70294994	28	1800	366.7	Angiosperm
Cerling & Harris, 1999	Samburu County	Kenya	0.55	37.6	630	-28.24	-33.24	-7.586	21.25421915	28	1800	366.7	Angiosperm
Cerling & Harris, 1999	Laikipia County	Kenya	0.3	37	1000	-27.78571429	-32.78571429	-7.931	20.42215855	28	2500	366.7	Angiosperm
Cerling & Harris, 1999	Turkana County	Kenya	3.5	36	200	-27.1	-32.1	-7.931	19.70294994	29.1	425	366.7	Angiosperm
Cerling et al., 2004	Ituri	Congo	1.35	28.58333333	1700	-29	-34	-7.954	21.67456231	27.7	1040	375.8	Angiosperm
Chen et al., 2002	Toksun	China	43.17	87.83	650	-26.5	-31.5	-8.05	18.95223421	6.1	650	371.14	Angiosperm

Chen et al., 2002	Jinta	China	40	98.9	1250	-26.9	-31.9	-8.05	19.37108211	8	1250	371.14	Angiosperm
Chevillat et al., 2005	Leymen	France	47.47	7.5	795	-27.01466759	-32.01466759	-7.98	19.56315985	11.1	550	377.52	Mixed
Chikaraishi and Naraoka 2003	Tokyo	Japan	35.6895	139.6917	1369	-30.3	-35.3	-8.07	22.92461586	15.2	40	373.28	Mixed
Codron et al., 2005	Chicualacuala	Mozambique	-23	31.5	475	-26.91666667	-31.91666667	-8.07	19.36798835	23.8	315	377.52	Angiosperm
Damesin et al., 1997	Mauguio	France	43.58333333	3.966666667	663	-26.7	-31.7	-7.84	19.37737594	14.7	25	362.61	Angiosperm
Damesin et al., 1997	Mauguio	France	43.58333333	3.966666667	728	-27.7	-32.7	-7.84	20.42579451	14.7	186	362.61	Angiosperm
Damesin et al., 1997	Mauguio	France	43.58333333	3.966666667	1129	-27.25	-32.25	-7.84	19.9537394	14.7	250	362.61	Angiosperm
Damesin et al., 1997	Mauguio	France	43.58333333	3.966666667	1134	-27.9	-32.9	-7.84	20.63573706	14.7	250	362.61	Angiosperm
De Lillis et al., 2004	Pina	Nepal	29.54166667	82.06933333	929	-26.83498629	-31.83498629	-7.82	19.53932378	11	3000	375.8	Mixed
DeLucia and Schlesinger, 1991	Markleeville	USA	38.68	-119.72	950	-24.87333333	-29.87333333	-7.7	17.61138724	6.23	2088	354.39	Mixed
DeLucia and Schlesinger, 1991	Storey County	USA	39.47	-119.38	200	-22.88333333	-27.88333333	-7.7	15.53891552	10.3	1700	354.39	Mixed
DeLucia and Schlesin	Reno	USA	39.38	-119.72	255	-23.456	-28.456	-7.7	16.13444965	10.3	1615	354.39	Mixed

ger, 1991													
DeLucia and Schlesinger, 1991	Reno	USA	39.55	-119.88	262	-23.54	-28.54	-7.7	16.22186265	10.3	1710	354.39	Mixed
Derner et al., 2006	Zeandale	USA	39.05	-96.35	835	-27.5	-32.5	-8.5	19.53727506	12.8	444	379.8	Angiosperm
Diefendorf et al., 2010	Santa Cruz	USA	37.01	-122.06	1089.59	-27.94509882	-32.94509882	-8.2	20.31274036	14.5	297	387.43	Mixed
Diefendorf et al., 2011	Wyoming Castle Garden	USA	42.9	-107.6	286	-25	-30	-8.2	17.23076923	6.2	1870	389.9	Angiosperm
Diefendorf et al., 2011	Wyoming Cabin Fork	USA	43.98	-106.7	321.4	-27.4	-32.4	-8.2	19.74090068	6.8	1480	389.9	Angiosperm
Diefendorf et al., 2011	Penn State University	USA	40.79	-77.8599	1001	-28.5	-33.5	-8.2	20.89552239	9.6	360	389.9	Angiosperm
Diefendorf et al., 2011	Panama	USA	9.3	-79.9	328	-28.7	-33.7	-8.2	21.10573458	26.12	130	389.9	Angiosperm
Diels et al., 2001	Ibadan	Nigeria	7.5	3.9	1278	-28.2	-33.2	-8.02	20.76558963	27.14	230	369.55	Angiosperm
Dodd et al., 1998	Nunn	USA	40.85	-104.7166667	321	-27.95	-32.95	-7.88	20.64708606	9.1	1650	363.73	Angiosperm
Donovan and Ehleringer, 1991	Salt Lake City	USA	40.76666667	-111.8333333	580	-27.23	-32.23	-7.72	20.05612838	7.2	1630	354.39	Angiosperm
Du et al., 2014	Lushan Mountain	China	29.5793	115.9942	2112	-28.3	-33.3	-8.5	20.37665946	11.3	1264	396.52	Mixed
Du et al., 2014	Lushan Mountain	China	29.5793	115.9942	1429	-27	-32	-8.5	19.01336074	16.2	219	396.52	Mixed
Dungait et al.,	Yarnton	UK	51.775	-1.2875	644	-29.04	-34.04	-7.99	21.67957485	10.3	60	383.79	Angiosperm

2008													
Ehleringer & Cooper, 1988	Golden Valley	USA	34.95	-114.4166667	175	-26.1	-31.1	-7.68	18.91364616	23.4	657	349.19	Angiosperm
Ehleringer et al., 1987	Gaoyao	China	23.13	112.5833333	1927	-30.19	-35.19	-7.66	23.2313546	21.4	250	347.42	Angiosperm
Ehleringer et al., 1992	Golden Valley	USA	34.95	-114.4166667	150	-26.07492184	-31.07492184	-7.7	18.86687411	20	785	355.61	Angiosperm
Ehleringer et al., 1998	n/a	South America	-25	-71	1	-22.75	-27.75	-7.7	15.40035815	22	965	363.73	Angiosperm
Ehleringer et al., 1998	n/a	South America	-25	-71	1	-24.27142857	-29.27142857	-7.7	16.98364592	22	90	363.73	Angiosperm
Ehleringer et al., 1998	n/a	South America	-25	-71	3	-25.1	-30.1	-7.7	17.84798441	22	570	363.73	Angiosperm
Ehleringer et al., 1998	n/a	South America	-26	-71	10	-23.2	-28.2	-7.7	15.86814087	22	400	363.73	Angiosperm
Escudero et al., 2008	San Pelayo de Guareña	Spain	41.05	-5.875	1163	-26.81	-31.81	-8.06	19.26653583	10.1	1335	383.79	Mixed
Escudero et al., 2008	San Pelayo de Guareña	Spain	41.05	-5.875	1099	-28.17	-33.17	-8.06	20.69291954	10.9	1178	383.79	Mixed
Escudero et al., 2008	San Pelayo de Guareña	Spain	41.05	-5.875	241	-26.66	-31.66	-8.06	19.10945815	11.9	789	383.79	Mixed
Escudero et al., 2008	San Pelayo de Guareña	Spain	41.05	-5.875	577	-28.29	-33.29	-8.06	20.81896862	11.9	800	383.79	Mixed
Escudero et al., 2008	San Pelayo de Guareña	Spain	41.05	-5.875	416	-27.17	-32.17	-8.06	19.64371987	12	700	383.79	Mixed
Escudero et al.,	San Pelayo de	Spain	41.05	-5.875	585	-28.36	-33.36	-8.06	20.89251163	12.1	800	383.79	Mixed

2008	Guareña												
Escudero et al., 2008	San Pelayo de Guareña	Spain	41.05	-5.875	400	-25.94	-30.94	-8.06	18.35615876	12.4	706	383.79	Mixed
Escudero et al., 2008	San Pelayo de Guareña	Spain	41.05	-5.875	616	-27.46	-32.46	-8.06	19.94776564	12.6	708	383.79	Mixed
Feranec, 2007	Gardiner	USA	45	-110.5	500	-28.5	-33.5	-8.05	21.0499228	4.6	2350	381.9	Mixed
Fischer and Tieszen, 1995	Palm and Tabonuco	Puerto Rico	18.3	65.78	2000	-30	-35	-7.85	22.83505155	0.021677	1075	358.83	Angiosperm
Fischer and Tieszen, 1995	Colorado and Dwarf	Puerto Rico	18.3	65.78	4000	-30.2	-35.2	-7.85	23.04598886	0.021677	1075	358.83	Angiosperm
Franco et al., 2005	São Sebastião	Brazil	-15.93	-47.8	1483	-27.6214455	-32.6214455	-7.88	20.30222222	23.2	1100	377.52	Gymnosperm
Garcin et al., 2014	Baleng	Cameroon	5.5	10.4	1850	-32	-37	-8.2	24.58677686	21.49	1374	396.52	Angiosperm
Garcin et al., 2014	Tizong	Cameroon	7.2	13.6	1450	-30.7	-35.7	-8.2	23.21262767	22.22	1000	396.52	Angiosperm
Garcin et al., 2014	Assom	Cameroon	6.6	12.9	1740	-30.4	-35.4	-8.2	22.8960396	23.24	600	396.52	Angiosperm
Garcin et al., 2014	Barombi Mbo	Cameroon	4.662	9.4034	2550	-31.5	-36.5	-8.2	24.05782137	24.89	300	396.52	Angiosperm
Garcin et al., 2014	Manengouba	Cameroon	5.03	9.83	2700	-30.1	-35.1	-8.2	22.57964739	25.22	2411	396.52	Angiosperm
Garcin et al., 2014	Mamguiewa	Cameroon	8.3909	13.7089	1560	-30	-35	-8.2	22.4742268	26.56	1000	396.52	Angiosperm
Garcin et al.,	Rhumsiki	Cameroo	10.4833	13.6	970	-28	-33	-8.2	20.37037037	26.7	1200	396.52	Angiosperm

2014		n												
Garcin et al., 2014	Mora	Cameroon	11.0465	14.1408	540	-28.7	-33.7	-8.2	21.10573458	27.51	455	396.52	Angiosperm
Garten and Taylor, 1992	Oak Ridge	USA	35.97	-84.28333333	1176.833333	-29.75	-34.75	-7.7	22.72610152	14.4	300	355.61	Angiosperm
Gerdol et al., 2000	Soraga	Italy	46.35	11.83333333	1200	-29.32565112	-34.32565112	-7.91	22.06265278	5	1600	368.38	Angiosperm
Gouveia & Freitas, 2009	National Forestry Inventory	Portugal	39.415	7.475	879	-28.21316614	-33.21316614	-8.12	20.67651613	12.5	590	385.6	Angiosperm
Gouveia & Freitas, 2009	National Forestry Inventory	Portugal	41.452	7.167	592	-26.40102071	-31.40102071	-8.12	18.77674597	14.5	260	385.6	Angiosperm
Gouveia & Freitas, 2009	National Forestry Inventory	Portugal	41.32	7.209	552	-26.59209106	-31.59209106	-8.12	18.97672177	14.6	550	385.6	Angiosperm
Gouveia & Freitas, 2009	National Forestry Inventory	Portugal	39.301	7.643	663	-26.3054574	-31.3054574	-8.12	18.67675806	15	304	385.6	Angiosperm
Gouveia & Freitas, 2009	National Forestry Inventory	Portugal	41.557	7.035	696	-25.34879151	-30.34879151	-8.12	17.67687903	15	520	385.6	Angiosperm
Gouveia & Freitas, 2009	National Forestry Inventory	Portugal	39.874	7.011	715	-26.3054574	-31.3054574	-8.12	18.67675806	15	376	385.6	Angiosperm
Gouveia & Freitas, 2009	National Forestry Inventory	Portugal	39.337	7.578	764	-26.3054574	-31.3054574	-8.12	18.67675806	15	317	385.6	Angiosperm
Gouveia	National	Portugal	41.526	7.07	799	-	-	-8.12	18.47678	15	380	385.6	Angiospe

& Freitas, 2009	Forestry Inventory					26.11427449	31.11427449		226				rm
Gouveia & Freitas, 2009	National Forestry Inventory	Portugal	40.031	7.322	852	-27.45098039	-32.45098039	-8.12	19.8766129	15	356	385.6	Angiosperm
Gouveia & Freitas, 2009	National Forestry Inventory	Portugal	39.381	7.428	879	-27.83222266	-32.83222266	-8.12	20.27656452	15	600	385.6	Angiosperm
Gouveia & Freitas, 2009	National Forestry Inventory	Portugal	39.943	7.374	746	-27.45098039	-32.45098039	-8.12	19.8766129	15.1	380	385.6	Angiosperm
Gouveia & Freitas, 2009	National Forestry Inventory	Portugal	39.944	7.514	820	-27.64163889	-32.64163889	-8.12	20.07658871	15.1	385	385.6	Angiosperm
Gouveia & Freitas, 2009	National Forestry Inventory	Portugal	39.85	7.509	820	-27.73694012	-32.73694012	-8.12	20.17657661	15.4	326	385.6	Angiosperm
Gouveia & Freitas, 2009	National Forestry Inventory	Portugal	38.004	8.506	710	-26.11427449	-31.11427449	-8.12	18.47678226	15.5	138	385.6	Angiosperm
Gouveia & Freitas, 2009	National Forestry Inventory	Portugal	38.546	8.653	670	-26.68759812	-31.68759812	-8.12	19.07670968	15.9	50	385.6	Angiosperm
Gouveia & Freitas, 2009	National Forestry Inventory	Portugal	39.238	7.652	620	-27.64163889	-32.64163889	-8.12	20.07658871	16	277	385.6	Angiosperm
Gouveia & Freitas, 2009	National Forestry Inventory	Portugal	37.532	8.48	624	-25.82735932	-30.82735932	-8.12	18.17681855	16	130	385.6	Angiosperm
Gouveia	National	Portugal	37.424	8.464	642	-	-	-8.12	18.47678	16	110	385.6	Angiospe

& Freitas, 2009	Forestry Inventory					26.11427449	31.11427449		226				rm
Gouveia & Freitas, 2009	National Forestry Inventory	Portugal	37.64	8.412	691	-27.64163889	-32.64163889	-8.12	20.07658871	16	250	385.6	Angiosperm
Gouveia & Freitas, 2009	National Forestry Inventory	Portugal	38.061	8.707	700	-26.78308643	-31.78308643	-8.12	19.17669758	16	110	385.6	Angiosperm
Gouveia & Freitas, 2009	National Forestry Inventory	Portugal	38.16	8.568	737	-25.63598861	-30.63598861	-8.12	17.97684274	16	130	385.6	Angiosperm
Gouveia & Freitas, 2009	National Forestry Inventory	Portugal	39.322	7.496	776	-27.16485241	-32.16485241	-8.12	19.57664919	16	420	385.6	Angiosperm
Gouveia & Freitas, 2009	National Forestry Inventory	Portugal	38.018	8.654	777	-26.11427449	-31.11427449	-8.12	18.47678226	16	210	385.6	Angiosperm
Gouveia & Freitas, 2009	National Forestry Inventory	Portugal	38.087	8.683	800	-26.40102071	-31.40102071	-8.12	18.77674597	16	190	385.6	Angiosperm
Gouveia & Freitas, 2009	National Forestry Inventory	Portugal	37.329	8.553	1299	-28.5938112	-33.5938112	-8.12	21.07646774	16.1	480	385.6	Angiosperm
Gouveia & Freitas, 2009	National Forestry Inventory	Portugal	39.852	7.302	612	-27.26024711	-32.26024711	-8.12	19.6766371	16.2	195	385.6	Angiosperm
Gouveia & Freitas, 2009	National Forestry Inventory	Portugal	37.716	8.353	491	-24.96559858	-29.96559858	-8.12	17.27692742	16.3	157	385.6	Angiosperm
Gouveia	National	Portugal	37.788	8.323	526	-	-	-8.12	16.87697	16.3	125	385.6	Angiospe

& Freitas, 2009	Forestry Inventory					24.58210423	29.58210423		581				rm
Gouveia & Freitas, 2009	National Forestry Inventory	Portugal	41.32	7.328	818	-28.02273173	-33.02273173	-8.12	20.47654032	16.3	350	385.6	Angiosperm
Gouveia & Freitas, 2009	National Forestry Inventory	Portugal	37.284	8.56	1018	-27.92748653	-32.92748653	-8.12	20.37655242	17.1	320	385.6	Angiosperm
Gouveia & Freitas, 2009	National Forestry Inventory	Portugal	38.009	8.39	609	-27.3556231	-32.3556231	-8.12	19.776625	17.5	70	385.6	Angiosperm
Gouveia & Freitas, 2009	National Forestry Inventory	Portugal	39.148	7.651	633	-25.73168336	-30.73168336	-8.12	18.07683065	17.5	236	385.6	Angiosperm
Guo and Xie, 2006	Golmud	China	33	92	240	-25.4	-30.4	-7.98	17.87399959	-5.077	4600	379.8	Angiosperm
Guo and Xie, 2006	Golmud	China	33	92	255	-25.1	-30.1	-7.98	17.56077546	-5.077	4600	379.8	Angiosperm
Guo and Xie, 2006	Golmud	China	33	92	255	-25.3	-30.3	-7.98	17.76957012	-5.077	4600	379.8	Angiosperm
Guo and Xie, 2006	Golmud	China	33	92	285	-26.05	-31.05	-7.98	18.55331383	-5.077	3400	379.8	Angiosperm
Guo and Xie, 2006	Golmud	China	33	92	315	-24.9	-29.9	-7.98	17.35206645	-5.077	4800	379.8	Angiosperm
Guo and Xie, 2006	Golmud	China	33	92	320	-25.8	-30.8	-7.98	18.29193184	-5.077	4200	379.8	Angiosperm
Guo and Xie, 2006	Golmud	China	33	92	345	-26.25	-31.25	-7.98	18.76251605	-5.077	4100	379.8	Angiosperm

Guo and Xie, 2006	Golmud	China	33	92	355	-24.9	-29.9	-7.98	17.35206645	-5.077	4800	379.8	Angiosperm
Guo and Xie, 2006	Golmud	China	33	92	355	-24.95	-29.95	-7.98	17.40423568	-5.077	4200	379.8	Angiosperm
Guo and Xie, 2006	Golmud	China	33	92	360	-23.8	-28.8	-7.98	16.20569555	-5.077	4250	379.8	Angiosperm
Guo and Xie, 2006	Golmud	China	33	92	365	-25.7	-30.7	-7.98	18.18741661	-5.077	4300	379.8	Angiosperm
Guo and Xie, 2006	Golmud	China	33	92	365	-26.8	-31.8	-7.98	19.33826552	-5.077	4800	379.8	Angiosperm
Guo and Xie, 2006	Golmud	China	33	92	375	-25.35	-30.35	-7.98	17.82178218	-5.077	4600	379.8	Angiosperm
Guo and Xie, 2006	Golmud	China	33	92	382	-27.4	-32.4	-7.98	19.9670985	-5.077	4200	379.8	Angiosperm
Guo and Xie, 2006	Golmud	China	33	92	425	-24.7	-29.7	-7.98	17.14344304	-5.077	4900	379.8	Angiosperm
Guo and Xie, 2006	Golmud	China	33	92	425	-25.4	-30.4	-7.98	17.87399959	-5.077	4600	379.8	Angiosperm
Guo and Xie, 2006	Golmud	China	33	92	433	-25.2	-30.2	-7.98	17.66516208	-5.077	4100	379.8	Angiosperm
Guo and Xie, 2006	Golmud	China	33	92	438	-27	-32	-7.98	19.54779034	-5.077	3600	379.8	Angiosperm
Guo and Xie, 2006	Golmud	China	33	92	438	-27.9	-32.9	-7.98	20.49171896	-5.077	3500	379.8	Angiosperm
Guo and Xie, 2006	Golmud	China	33	92	442	-25.8	-30.8	-7.98	18.29193184	-5.077	4200	379.8	Angiosperm
Guo and	Golmud	China	33	92	457	-26.5	-31.5	-7.98	19.02413	-5.077	4700	379.8	Angiospe

Xie, 2006									97				rm
Guo and Xie, 2006	Golmud	China	33	92	465	-26.2	-31.2	-7.98	18.71020743	-5.077	4100	379.8	Angiosperm
Guo and Xie, 2006	Golmud	China	33	92	465	-26.3	-31.3	-7.98	18.81483003	-5.077	4100	379.8	Angiosperm
Guo and Xie, 2006	Golmud	China	33	92	465	-28.5	-33.5	-7.98	21.12197633	-5.077	3800	379.8	Angiosperm
Guo and Xie, 2006	Golmud	China	33	92	475	-24.9	-29.9	-7.98	17.35206645	-5.077	4800	379.8	Angiosperm
Guo and Xie, 2006	Golmud	China	33	92	475	-25.55	-30.55	-7.98	18.03068398	-5.077	4800	379.8	Angiosperm
Guo and Xie, 2006	Golmud	China	33	92	480	-24.9	-29.9	-7.98	17.35206645	-5.077	4800	379.8	Angiosperm
Hanba et al., 1997	Hitsujigaoka	Japan	43	141.4	1130	-28.9	-33.9	-7.14	22.40757903	7.3	185	362.61	Angiosperm
Hartman et al., 2010	Ramat HaNegev	Israel	30.937	34.605	89	-24.65	-29.65	-8.16	16.90675142	19.17	354	387.43	Mixed
Hartman et al., 2010	Ramat HaNegev	Israel	31.02	34.782	98	-26.05	-31.05	-8.16	18.36849941	19.17	362	387.43	Mixed
Hartman et al., 2010	Turkana County	Kenya	31.768	35.118	605	-27.5	-32.5	-8.16	19.88688946	19.23	639	387.43	Mixed
Hartman et al., 2010	n/a	Jerusalem	31.584	35.406	80	-26.55	-31.55	-8.16	18.89157122	19.23	391	387.43	Mixed
Hartman et al., 2010	n/a	Jerusalem	31.583	35.403	82	-26.3	-31.3	-8.16	18.62996816	19.23	328	387.43	Mixed
Hartman et al., 2010	n/a	Jerusalem	31.813	35.4	198	-26.25	-31.25	-8.16	18.57766367	19.23	115	387.43	Mixed

Hartman et al., 2010	n/a	Jerusalem	31.831	35.349	314	-26.3	-31.3	-8.16	18.62996816	19.23	269	387.43	Mixed
Hartman et al., 2010	n/a	Jerusalem	31.832	35.349	314	-26.3	-31.3	-8.16	18.62996816	19.23	245	387.43	Mixed
Hartman et al., 2010	n/a	Jerusalem	31.825	35.325	356	-27.25	-32.25	-8.16	19.62477512	19.23	347	387.43	Mixed
Hartman et al., 2010	Harei Yehuda	Israel	31.773	35.089	593	-27.1	-32.1	-8.16	19.46757118	19.23	775	387.43	Mixed
Hartman et al., 2010	Harei Yehuda	Israel	31.823	35.087	706	-27.8	-32.8	-8.16	20.20160461	19.23	656	387.43	Mixed
Hartman et al., 2010	Kinneret	Israel	32.655	35.424	503	-28.6	-33.6	-8.16	21.04179535	19.52	81	387.43	Mixed
Hartman et al., 2010	Ma'ale Yosef	Israel	32.954	35.331	994	-26.65	-31.65	-8.16	18.99625006	19.52	847	387.43	Mixed
Hartman et al., 2010	Lachish	Israel	31.611	34.927	375	-26.85	-31.85	-8.16	19.2056723	19.99	346	387.43	Mixed
Hartman et al., 2010	Judean Foothills	Israel	31.719	34.908	498	-27.1	-32.1	-8.16	19.46757118	19.99	229	387.43	Mixed
Hartman et al., 2010	Ramat HaNegev	Israel	30.504	34.608	77	-25.65	-30.65	-8.16	17.95042849	20.07	993	387.43	Mixed
Hartman et al., 2010	Ramat HaNegev	Israel	30.79	34.469	75	-25.9	-30.9	-8.16	18.21168258	20.11	329	387.43	Mixed
Hartman et al., 2010	Ramat HaNegev	Israel	31.076	34.836	133	-25.9	-30.9	-8.16	18.21168258	20.16	357	387.43	Mixed
Hartman et al., 2010	Be'er Sheva	Israel	31.265	34.822	184	-26.45	-31.45	-8.16	18.78691387	20.16	339	387.43	Mixed
Hartman	Benei	Israel	31.369	34.826	296	-27.05	-32.05	-8.16	19.41518	20.16	353	387.43	Mixed

et al., 2010	Shim'on								064				
Hartman et al., 2010	n/a	Israel	32.616	34.931	593	-27.1	-32.1	-8.16	19.46757 118	20.79	17	387.43	Mixed
Hartman et al., 2010	Ezor Zihron Ya'akov	Israel	32.73	35	697	-28.5	-33.5	-8.16	20.93669 583	20.79	334	387.43	Mixed
He et al., 2008	Mengla	China	21.6	101.5833 333	1500	-28.5	-33.5	-8.14	20.95728 255	21	900	383.79	Angiosperm
Hemming et al., 2005	Sodankylä	Finland	67.4	26.7	500	-29.2	-34.2	-8.05	21.78615 575	-1	180	377.52	Angiosperm
Hemming et al., 2005	Kangasala	Finland	61.5	24.2	640	-26.67	-31.67	-8.05	19.13020 25	3.5	170	377.52	Angiosperm
Hemming et al., 2005	Staré Hamry	Czechia	49.5	18.5	1100	-28.32	-33.32	-8.05	20.86077 721	4.9	898	377.52	Angiosperm
Hemming et al., 2005	Tuscania	Italy	42.4	11.9	1180	-27.6	-32.6	-8.05	20.10489 51	6.3	1150	377.52	Angiosperm
Hemming et al., 2005	Lastebasse	Italy	45.9	11.3	1150	-27.2	-32.2	-8.05	19.68544 408	6.9	150	377.52	Angiosperm
Hemming et al., 2005	Klingenberg	Germany	50.9	13.5	820	-26.89	-31.89	-8.05	19.36060 671	7.7	380	377.52	Angiosperm
Hemming et al., 2005	Aberfeldy	UK	56.6	-3.8	1200	-29.25	-34.25	-8.05	21.83878 445	8	340	377.52	Angiosperm
Hemming et al., 2005	Saint-Quirin	France	48.6	7.1	885	-28.6	-33.6	-8.05	21.15503 397	9.2	300	377.52	Angiosperm
Hemming et al., 2005	Luntere	Netherlands	52.1	5.6	786	-28.75	-33.75	-8.05	21.31274 131	9.8	25	377.52	Angiosperm
Hemming et al., 2005	Brasschaat	Belgium	51.3	4.5	750	-28.7	-33.7	-8.05	21.26016 679	10	16	377.52	Angiosperm

Hemming et al., 2005	Mios	France	44.7	-0.8	950	-28.67	-33.67	-8.05	21.22862467	13.5	60	377.52	Angiosperm
Hemming et al., 2005	Nossa Senhora da Tourega	Portugal	38.5	-8	920	-27.66	-32.66	-8.05	20.16784252	14.2	235	377.52	Angiosperm
Hemming et al., 2005	Castelfranco Emilia	Italy	44.6	11.1	1000	-29.27	-34.27	-8.05	21.85983744	14.5	25	377.52	Angiosperm
Hemming et al., 2005	Ezor Be'er Sheva	Israel	31.2	35	275	-23.17	-28.17	-8.05	15.47864009	22	680	377.52	Angiosperm
Holtum and Winter, 2005	Panama	USA	8.97	-79.38333333	1800	-28.7	-33.7	-7.82	21.49696283	26.7	85	377.52	Angiosperm
Inagaki et al., 2004	Otoyo	Japan	33.8	133.7333333	2720	-28.13333333	-33.13333333	-7.89	20.82933187	20.83447661	606.666667	375.8	Gymnosperm
Inagaki et al., 2004	Otoyo	Japan	33.8	133.7333333	2580	-28.375	-33.375	-7.89	21.08323685	21.08838286	892	375.8	Gymnosperm
Keitel et al., 2006	Varces-Allières-et-Risset	France	45.05	5.67	1450	-29.1	-34.1	-8.05	21.68091462	5.67	450	379.8	Angiosperm
Keitel et al., 2006	Saint-Étienne-les-Orgues	France	44.07	5.83	736	-26.4	-31.4	-8.05	18.84757601	5.83	1650	379.8	Angiosperm
Keitel et al., 2006	Saint-Étienne-les-Orgues	France	44.07	5.83	736	-27.5	-32.5	-8.05	20	5.83	1250	379.8	Angiosperm
Keitel et al., 2006	Saint-Étienne-les-Orgues	France	44.07	5.83	736	-28.4	-33.4	-8.05	20.94483326	5.83	1030	379.8	Angiosperm
Keitel et al., 2006	Waldsee	Germany	48	7.85	950	-29.1	-34.1	-8.05	21.68091462	7.85	280	379.8	Angiosperm
Keitel et al., 2006	Tannheim	Germany	48	8.4	856	-29.5	-34.5	-8.05	22.10200927	8.4	750	379.8	Angiosperm
Keitel et	Tannheim	Germany	48	8.4	856	-30.3	-35.3	-8.05	22.94524	8.4	750	379.8	Angiospe

al., 2006									08				rm
Keitel et al., 2006	Bärenthal	Germany	48.08	8.9	910	-29.3	-34.3	-8.05	21.89141856	8.9	890	379.8	Angiosperm
Keitel et al., 2006	Mühlhausen	Germany	51.22	10.45	700	-29.3	-34.3	-8.05	21.89141856	10.45	400	379.8	Angiosperm
Keitel et al., 2006	Ried	Germany	48.3	11.1	800	-30.1	-35.1	-8.05	22.73430251	11.1	540	379.8	Angiosperm
Keitel et al., 2006	Gasseldorf	Germany	49.8	11.2	903	-28.5	-33.5	-8.05	21.0499228	11.2	300	379.8	Angiosperm
Kloeppel et al., 1998	Norilsk	Russia	69.4	88.28333333	450	-26.3	-31.3	-7.9	18.89699086	-10.1	75	363.73	Gymnosperm
Kloeppel et al., 1998	Division No. 22	Canada	56	-98.5	524.64	-27.88035808	-32.88035808	-7.9	20.55339407	-2.5	213	363.73	Gymnosperm
Kloeppel et al., 1998	Davos	Switzerland	46.77166667	9.8675	1215.48	-27.2	-32.2	-7.9	19.83963816	0.9	2000	363.73	Gymnosperm
Kloeppel et al., 1998	Burr	Canada	52	-105	390.24	-27.51526224	-32.51526224	-7.9	20.17025201	2	556	363.73	Gymnosperm
Kloeppel et al., 1998	Southern Region	Iceland	64.3	-20.41666667	635.28	-28.54588077	-33.54588077	-7.9	21.25255363	3.1	200	363.73	Gymnosperm
Kloeppel et al., 1998	Seeley Lake	USA	47.92	-113.8166667	588.48	-26.9525108	-31.9525108	-7.9	19.58024763	4.1	1012	363.73	Gymnosperm
Kloeppel et al., 1998	Lake Tomahawk	USA	45.77	-89.56666667	811.29	-27.73610178	-32.73610178	-7.9	20.40197298	4.4	482	363.73	Gymnosperm
Kloeppel et al., 1998	Troy	USA	48.42	-115.8	826.49	-27.75518578	-32.75518578	-7.9	20.42200225	4.9	706	363.73	Gymnosperm
Kloeppel et al., 1998	Lincoln Heights	Canada	45.93	-66.63333333	1142.4	-27.05739029	-32.05739029	-7.9	19.69015449	5.2	72	363.73	Gymnosperm
Kloeppel et al., 1998	Sils im Engadin/Segl	Switzerland	46.4	9.8	1215.48	-25.46098549	-30.46098549	-7.9	18.01978703	5.6	2000	363.73	Gymnosperm
Kloeppe	Missoula	USA	46.85	-	740.12	-	-	-7.9	18.58068	6.1	1158	363.73	Gymnosp

l et al., 1998				113.8833333		25.99763122	30.99763122		501				erm
Kloeppel et al., 1998	Lolo	USA	46.7	-114.1666667	941.47	-26.24038213	-31.24038213	-7.9	18.83460948	6.3	2130	363.73	Gymnosperm
Kloeppel et al., 1998	Kamniška	Slovenia	46.25	14.55	1721.04	-27.07088896	-32.07088896	-7.9	19.70430193	8.2	1700	363.73	Gymnosperm
Kloeppel et al., 1998	Xiaojin	China	30.82	102.5	840.96	-27.44763031	-32.44763031	-7.9	20.0993087	9.5	3500	363.73	Gymnosperm
Kloeppel et al., 1998	Lokve	Slovenia	45.55	15.15	1235.28	-26.82605862	-31.82605862	-7.9	19.44776552	9.8	300	363.73	Gymnosperm
Leffler and Enquist, 2002	Guanacaste Province	Costa Rica	10.75	-85.61666667	1565	-29.94	-34.94	-7.89	22.73055275	25.9	100	371.14	Angiosperm
Lockheart et al., 1997	Westonbirt	UK	51.6	-2.229166667	829.92	-27.55135997	-32.55135997	-7.82	20.29038774	10.3	140	362.61	Angiosperm
Ma et al., 2012	Gansu	China	38.5	102.54	105	-26.92	-31.92	-8	19.5	-0.66333	1350	391.65	Angiosperm
Ma et al., 2012	Gansu	China	38.55	102.43	106	-25.88	-30.88	-8	18.4	-0.66333	1380	391.65	Angiosperm
Ma et al., 2012	Gansu	China	38.59	103.3	107.5	-27.4	-32.4	-8	19.9	-0.66333	1310	391.65	Angiosperm
Ma et al., 2012	Gansu	China	38.58	102.29	107.6	-26.58	-31.58	-8	19.1	-0.66333	1400	391.65	Angiosperm
Ma et al., 2012	Gansu	China	39.01	101.59	124.5	-24.76	-29.76	-8	17.2	-0.66333	1400	391.65	Angiosperm
Ma et al., 2012	Gansu	China	38.57	102.16	121.4	-26.28	-31.28	-8	18.84660812	-0.66333	1340	391.65	Angiosperm
Ma et al., 2012	Gansu	China	38.41	102.18	138.6	-26.63	-31.63	-8	18.1	-0.66333	1420	391.65	Angiosperm
Ma et al., 2012	Neimeng	China	41.44	100.07	23.7	-23.8	-28.8	-8	16.18520795	-0.46583	973	391.65	Angiosperm
Ma et al., 2012	Neimeng	China	41.36	99.53	25.8	-23.92	-28.92	-8	16.31013851	-0.46583	1010	391.65	Angiosperm
Ma et	Neimeng	China	41.47	100.24	28.7	-24.5775	-29.5775	-8	17	-0.46583	945	391.65	Angiospe

al., 2012													rm
Ma et al., 2012	Neimeng	China	41.57	102.16	29.6	-26.24	-31.24	-8	18.7	-0.46583	1114	391.65	Angiosperm
Ma et al., 2012	Neimeng	China	41.49	100.33	31.8	-26.51666667	-31.51666667	-8	19	-0.46583	978	391.65	Angiosperm
Ma et al., 2012	Neimeng	China	41.26	99.43	33.4	-22.06	-27.06	-8	14.37716015	-0.46583	1080	391.65	Angiosperm
Ma et al., 2012	Neimeng	China	42	101.44	33.9	-26.37	-31.37	-8	18.86753695	-0.46583	930	391.65	Angiosperm
Ma et al., 2012	Neimeng	China	41.57	100.55	37.3	-25.57	-30.57	-8	18.03105405	-0.46583	948	391.65	Angiosperm
Ma et al., 2012	Neimeng	China	42.54	102.43	40	-25.89	-30.89	-8	18.36548234	-0.46583	1080	391.65	Angiosperm
Ma et al., 2012	Neimeng	China	41.14	99.27	45.9	-24.65	-29.65	-8	17.1	-0.46583	1370	391.65	Angiosperm
Ma et al., 2012	Neimeng	China	40.59	99.25	53	-24.85	-29.85	-8	17.3	-0.46583	1300	391.65	Angiosperm
Ma et al., 2012	Neimeng	China	41.29	103.28	54.2	-26.41	-31.41	-8	18.9	-0.46583	905	391.65	Angiosperm
Ma et al., 2012	Neimeng	China	40.32	100.29	56.7	-25.62	-30.62	-8	18.1	-0.46583	1320	391.65	Angiosperm
Ma et al., 2012	Neimeng	China	40.45	100.24	58.6	-25.36	-30.36	-8	18.9	-0.46583	1400	391.65	Angiosperm
Ma et al., 2012	Neimeng	China	41.18	103.53	75	-25.05	-30.05	-8	17.5	-0.46583	848	391.65	Angiosperm
Ma et al., 2012	Neimeng	China	40.21	104.45	100.5	-26.88	-31.88	-8	19.4	-0.46583	1280	391.65	Angiosperm
Ma et al., 2012	Neimeng	China	39.41	105.43	86.5	-25.88	-30.88	-8	18.35502813	-0.46583	1000	391.65	Angiosperm
Ma et al., 2012	Neimeng	China	39.55	100.57	90.1	-23.97	-28.97	-8	16.36220198	-0.46583	1390	391.65	Angiosperm
Ma et al., 2012	Neimeng	China	41.09	104.14	90.8	-26.58	-31.58	-8	19.1	-0.46583	933	391.65	Angiosperm
Ma et al., 2012	Neimeng	China	39.47	101.13	94.6	-27.03	-32.03	-8	19.6	-0.46583	1340	391.65	Angiosperm
Ma et al., 2012	Neimeng	China	40.52	104.27	94.3	-26.1	-31.1	-8	18.6	-0.46583	1480	391.65	Angiosperm
Ma et al., 2012	Neimeng	China	39.43	101.25	105.3	-26.44	-31.44	-8	18.9	-0.46583	1320	391.65	Angiosperm

Ma et al., 2012	Neimeng	China	40.3	104.39	97.3	-26.53	-31.53	-8	19.01	-0.46583	1290	391.65	Angiosperm
Ma et al., 2012	Neimeng	China	40.05	104.53	108.1	-26.59	-31.59	-8	19.1	-0.46583	1390	391.65	Angiosperm
Ma et al., 2012	Neimeng	China	39.47	105.04	112	-25.97	-30.97	-8	18.4	-0.46583	1440	391.65	Angiosperm
Ma et al., 2012	Neimeng	China	39.3	105.36	113.2	-25.87	-30.87	-8	17.9	-0.46583	1070	391.65	Angiosperm
Ma et al., 2012	Neimeng	China	39.35	105.17	115.9	-26.59	-31.59	-8	19.1	-0.46583	1230	391.65	Angiosperm
Ma et al., 2012	Neimeng	China	39.1	101.44	116.6	-24.26	-29.26	-8	16.7	-0.46583	1580	391.65	Angiosperm
Ma et al., 2012	Neimeng	China	39.19	105.56	146.5	-25.43	-30.43	-8	17.9	-0.46583	1350	391.65	Angiosperm
Ma et al., 2012	Neimeng	China	39.22	105.42	143.9	-26.4	-31.4	-8	18.9	-0.46583	1150	391.65	Angiosperm
Ma et al., 2012	Neimeng	China	39.18	107.08	171.4	-26.14	-31.14	-8	18.6	-0.46583	1360	391.65	Angiosperm
Ma et al., 2012	Ningxia	China	38.46	106.1	194.3	-25.41	-30.41	-8	17.9	-0.46583	1830	391.65	Angiosperm
Ma et al., 2012	Ningxia	China	38.17	106.06	205.9	-25.59	-30.59	-8	18	-0.46583	1870	391.65	Angiosperm
Ma et al., 2012	Neimeng	China	39.15	107.3	207.8	-26	-31	-8	18.4	-0.46583	1360	391.65	Angiosperm
Ma et al., 2012	Ningxia	China	37.31	105.39	254.1	-27.14	-32.14	-8	19.7	-0.46583	1810	391.65	Angiosperm
Ma et al., 2012	Ningxia	China	37.38	105.09	268.8	-24.77	-29.77	-8	17.2	-0.46583	1340	391.65	Angiosperm
Ma et al., 2012	Neimeng	China	39.08	107.55	270	-25.9	-30.9	-8	19.2	-0.46583	1500	391.65	Angiosperm
Ma et al., 2012	Neimeng	China	38.56	108.15	282.9	-25.31	-30.31	-8	17.8	-0.46583	1410	391.65	Angiosperm
Ma et al., 2012	Ningxia	China	37.05	105.18	286.3	-27.34	-32.34	-8	19.9	-0.46583	1900	391.65	Angiosperm
Ma et al., 2012	Neimeng	China	38.47	108.32	331	-27.27	-32.27	-8	19.8	-0.46583	1360	391.65	Angiosperm
Ma et al., 2012	Neimeng	China	38.37	108.46	333	-27.52	-32.52	-8	20.1	-0.46583	1340	391.65	Angiosperm
Ma et al., 2012	Neimeng	China	38.43	109.09	341.9	-26.59	-31.59	-8	19.1	-0.46583	1310	391.65	Angiosperm

Ma et al., 2012	Shanxi	China	38.11	112.29	436.2	-27.4	-32.4	-8	19.9	-0.46583	1350	391.65	Angiosperm
Ma et al., 2012	Shanxi	China	38.23	109.38	398.2	-25.6	-30.6	-8	18.1	-0.46583	1150	391.65	Angiosperm
Ma et al., 2012	Shanxi	China	38.3	109.27	381.8	-28.6	-33.6	-8	21.2	-0.46583	1220	391.65	Angiosperm
Ma et al., 2012	Shanxi	China	38.13	112.45	439.9	-26.23	-31.23	-8	18.7	-0.46583	1060	391.65	Angiosperm
Ma et al., 2012	Shanxi	China	38.25	112.34	445.1	-27.47	-32.47	-8	20	-0.46583	900	391.65	Angiosperm
Ma et al., 2012	Shanxi	China	36.48	110.36	523.9	-28.95	-33.95	-8	21.6	-0.46583	794	391.65	Angiosperm
Ma et al., 2012	Shanxi	China	37.25	110.46	481	-28.03	-33.03	-8	20.6	-0.46583	828	391.65	Angiosperm
Ma et al., 2012	Shanxi	China	37.3	110.34	456	-26.3	-31.3	-8	18.8	-0.46583	1100	391.65	Angiosperm
Ma et al., 2012	Shanxi	China	36.5	110.28	531.9	-29.04	-34.04	-8	21.7	-0.46583	631	391.65	Angiosperm
Ma et al., 2012	Shanxi	China	35.36	112.42	584.6	-28.59	-33.59	-8	21.3	-0.46583	1100	391.65	Angiosperm
Ma et al., 2012	Shanxi	China	36.05	113.21	552.7	-30.04	-35.04	-8	22.7225865	-0.46583	1320	391.65	Angiosperm
Ma et al., 2012	Shanxi	China	36.07	113.42	556.9	-28.7	-33.7	-8	21.3	-0.46583	1090	391.65	Angiosperm
Ma et al., 2012	Shanxi	China	35.37	112.5	582.4	-28.86	-33.86	-8	21.5	-0.46583	1056	391.65	Angiosperm
Ma et al., 2012	Shanxi	China	35.57	113.04	562.7	-28.44	-33.44	-8	21	-0.46583	1100	391.65	Angiosperm
McArthur and Moorhead, 1996	Martin	USA	33.18666667	-81.58916667	1215.39	-30.5428364	-35.5428364	-7.88	23.37683113	18.1	60	360.82	Angiosperm
Medina and Minchin, 1980	Rio Negro	Venezuela	2	-67	3500	-29.6	-34.6	-7.49	22.7844188	25.99	90	336.84	Angiosperm
Menzel et al., 2013	Lonar lake region	India	19.96	76.5	680	-29.1	-34.1	-8.2	21.52641879	23.8	800	393.85	Angiosperm
Miller et	Victoria	Australia	-18.2	131.5	410	-	-	-7.91	19.68694	25	340	369.55	Angiospe

al., 2001						27.06413022	32.06413022		013				rm
Miller et al., 2001	Gurindji	Australia	-19	131.5	390	-26.58687334	-31.58687334	-7.91	19.18699557	25.1	380	369.55	Angiosperm
Miller et al., 2001	Central Desert	Australia	-18.6	131.5	400	-26.49136578	-31.49136578	-7.91	19.08700665	25.1	360	369.55	Angiosperm
Miller et al., 2001	Central Desert	Australia	-19.7	131.5	350	-26.30029441	-31.30029441	-7.91	18.88702882	25.2	420	369.55	Angiosperm
Miller et al., 2001	Central Desert	Australia	-19.5	131.5	370	-25.5352583	-30.5352583	-7.91	18.08711752	25.2	400	369.55	Angiosperm
Miller et al., 2001	Lake MacKay	Australia	-22	131.5	300	-24.57727094	-29.57727094	-7.91	17.08722838	25.3	480	369.55	Angiosperm
Miller et al., 2001	Central Desert	Australia	-20.2	131.5	320	-25.05649995	-30.05649995	-7.91	17.58717295	25.3	440	369.55	Angiosperm
Miller et al., 2001	Lake MacKay	Australia	-22	131.5	280	-24.96069182	-29.96069182	-7.91	17.48718404	25.4	500	369.55	Angiosperm
Miller et al., 2001	Lake MacKay	Australia	-22	131.5	300	-25.34381139	-30.34381139	-7.91	17.88713969	25.4	460	369.55	Angiosperm
Miller et al., 2001	Lake MacKay	Australia	-23	131.5	270	-25.15228925	-30.15228925	-7.91	17.68716186	25.5	540	369.55	Angiosperm
Miller et al., 2001	Mereenie	Australia	-24	131.5	250	-26.68236217	-31.68236217	-7.91	19.28698448	25.6	560	369.55	Angiosperm
Miller et al., 2001	Lake MacKay	Australia	-23	131.5	270	-26.01354668	-31.01354668	-7.91	18.58706208	25.6	520	369.55	Angiosperm
Miller et al., 2001	Petermann	Australia	-24.3	131.5	230	-25.34381139	-30.34381139	-7.91	17.88713969	25.7	580	369.55	Angiosperm
Miller et al., 2001	Petermann	Australia	-25	131.5	200	-24.86486	-29.864864	-7.91	17.38719512	25.8	600	369.55	Angiosperm

						486	86						
Miller et al., 2001	Victoria River	Australia	-17.3	131.5	520	-26.77783227	-31.77783227	-7.91	19.38697339	25.8	300	369.55	Angiosperm
Miller et al., 2001	Delamere	Australia	-16.9	131.5	630	-27.73150416	-32.73150416	-7.91	20.38686253	26.5	280	369.55	Angiosperm
Miller et al., 2001	Gurindji NT	Australia	-17.8	131.5	470	-26.87328364	-31.87328364	-7.91	19.48696231	26.7	320	369.55	Angiosperm
Miller et al., 2001	Claravale	Australia	-14.6	131.5	900	-27.4455989	-32.4455989	-7.91	20.08689579	26.9	180	369.55	Angiosperm
Miller et al., 2001	Douglas-Daly	Australia	-13.7	131.5	1200	-27.73150416	-32.73150416	-7.91	20.38686253	26.9	120	369.55	Angiosperm
Miller et al., 2001	Delamere	Australia	-16	131.5	680	-27.15952544	-32.15952544	-7.91	19.78692905	27	260	369.55	Angiosperm
Miller et al., 2001	Delamere	Australia	-15.6	131.5	760	-27.63622109	-32.63622109	-7.91	20.28687361	27	240	369.55	Angiosperm
Miller et al., 2001	Delamere	Australia	-15.1	131.5	780	-27.73150416	-32.73150416	-7.91	20.38686253	27	220	369.55	Angiosperm
Miller et al., 2001	Delamere	Australia	-14.8	131.5	840	-27.9220143	-32.9220143	-7.91	20.58684035	27	200	369.55	Angiosperm
Miller et al., 2001	Burrundie	Australia	-13.4	131.5	1230	-27.73150416	-32.73150416	-7.91	20.38686253	27	100	369.55	Angiosperm
Miller et al., 2001	Margaret River	Australia	-13.1	131.5	1380	-27.63622109	-32.63622109	-7.91	20.28687361	27	80	369.55	Angiosperm
Miller et al., 2001	Douglas-Daly	Australia	-14	131.5	1090	-28.1124498	-33.1124498	-7.91	20.78681818	27.5	140	369.55	Angiosperm
Miller et al., 2001	Mount Bundey	Australia	-12.9	131.5	1450	-28.01724138	-33.01724138	-7.91	20.68682927	27.7	60	369.55	Angiosperm

Miller et al., 2001	Claravale	Australia	-14.3	131.5	990	-27.35025978	-32.35025978	-7.91	19.98690687	28	160	369.55	Angiosperm
Miller et al., 2001	Hotham	Australia	-12.4	131.5	1570	-28.68330886	-33.68330886	-7.91	21.38675166	28.4	40	369.55	Angiosperm
Mooney et al., 1989	N.A.	Mexico	10.5	-105.05	748	-26.97	-31.97	-7.7	19.80411704	26.1	50	351.57	Angiosperm
Murphy et al., 2009	Poatina TAS	Australia	-41.8075	146.87807	1018	-26.9	-31.9	-8.2	19.21693557	6.9	299	385.6	Angiosperm
Murphy et al., 2009	Rockton NSW	Australia	-37.09706	149.30635	998	-29.3	-34.3	-8.2	21.7368909	10.7	466	385.6	Angiosperm
Murphy et al., 2009	Rockton NSW	Australia	-37.09706	149.30635	998	-30.01	-35.01	-8.2	22.48476788	10.7	466	385.6	Angiosperm
Murphy et al., 2009	Wollomombi NSW	Australia	-30.49457	152.20602	1103	-26.9	-31.9	-8.2	19.21693557	11.9	964	385.6	Angiosperm
Murphy et al., 2009	Wollomombi NSW	Australia	-30.49457	152.20602	1103	-27.87	-32.87	-8.2	20.23391933	11.9	964	385.6	Angiosperm
Murphy et al., 2009	Bridport TAS	Australia	-41.04355	147.22781	788	-28.52	-33.52	-8.2	20.91653971	12.5	52	385.6	Angiosperm
Murphy et al., 2009	Bridport TAS	Australia	-41.04355	147.22781	788	-28.78	-33.78	-8.2	21.1898437	12.5	52	385.6	Angiosperm
Murphy et al., 2009	Thorpdale VIC	Australia	-38.34259	146.20386	1014	-30.95	-35.95	-8.2	23.47660079	12.5	252	385.6	Angiosperm
Murphy et al., 2009	Mirranatwa VIC	Australia	-37.42647	142.42386	673	-29.04	-34.04	-8.2	21.46329406	12.8	250	385.6	Angiosperm
Murphy et al., 2009	Mirranatwa VIC	Australia	-37.42647	142.42386	673	-29.71	-34.71	-8.2	22.16863	12.8	250	385.6	Angiosperm
Murphy	Lake	Australia	-	136.6002	305	-25.9	-30.9	-8.2	18.17061	16.2	265	385.6	Angiospe

et al., 2009	Gilles SA		33.11968						903				rm
Murphy et al., 2009	Yanga NSW	Australia	-34.71164	143.64693	315	-27.6	-32.6	-8.2	19.9506376	16.3	65	385.6	Angiosperm
Murphy et al., 2009	Yanga NSW	Australia	-34.71164	143.64693	315	-27.8	-32.8	-8.2	20.16046081	16.3	65	385.6	Angiosperm
Murphy et al., 2009	Hay NSW	Australia	-34.52878	144.74484	345	-26.95	-31.95	-8.2	19.26930785	16.4	93	385.6	Angiosperm
Murphy et al., 2009	Caiguna WA	Australia	-32.30623	125.1943	235	-23	-28	-8.2	15.14841351	16.5	122	385.6	Angiosperm
Murphy et al., 2009	Yalata SA	Australia	-31.61731	132.05025	283	-23.08	-28.08	-8.2	15.23154404	16.6	90	385.6	Angiosperm
Murphy et al., 2009	Yalata SA	Australia	-31.61731	132.05025	283	-24.88	-29.88	-8.2	17.105587	16.6	90	385.6	Angiosperm
Murphy et al., 2009	Arrowsmith WA	Australia	-34.38838	142.42599	294	-25.66	-30.66	-8.2	17.91982265	16.6	39	385.6	Angiosperm
Murphy et al., 2009	Mallee NSW	Australia	-34.38838	142.42599	294	-27.2	-32.2	-8.2	19.53125	16.6	47	385.6	Angiosperm
Murphy et al., 2009	Mallee NSW	Australia	-34.38838	142.42599	294	-28.55	-33.55	-8.2	20.94806732	16.6	89	385.6	Angiosperm
Murphy et al., 2009	Goolgowi NSW	Australia	-33.98825	145.69836	366	-25.35	-30.35	-8.2	17.59606012	16.6	115	385.6	Angiosperm
Murphy et al., 2009	Goolgowi NSW	Australia	-33.98825	145.69836	366	-27.72	-32.72	-8.2	20.07652117	16.6	113	385.6	Angiosperm
Murphy et al., 2009	Balladonia WA	Australia	-32.43955	124.0773	261	-24.68	-29.68	-8.2	16.89701841	16.8	278	385.6	Angiosperm
Murphy et al.,	Hillston NSW	Australia	-33.47877	145.57027	366	-30.57	-35.57	-8.2	23.07541545	17	122	385.6	Angiosperm

2009													
Murphy et al., 2009	Mount Palmer WA	Australia	-31.2846	119.8118	264	-28.9	-33.9	-8.2	21.31603336	17.2	371	385.6	Angiosperm
Murphy et al., 2009	Pandurra SA	Australia	-32.63178	137.38566	230	-26.2	-31.2	-8.2	18.48428835	17.3	81	385.6	Angiosperm
Murphy et al., 2009	Nymagee NSW	Australia	-31.89	145.9653	375	-26.47	-31.47	-8.2	18.76675603	17.6	260	385.6	Angiosperm
Murphy et al., 2009	Nymagee NSW	Australia	-31.89	145.9653	375	-27.13	-32.13	-8.2	19.45789263	17.6	260	385.6	Angiosperm
Murphy et al., 2009	Pithara WA	Australia	-30.40698	116.66428	327	-27.2	-32.2	-8.2	19.53125	18.3	301	385.6	Angiosperm
Murphy et al., 2009	Laverton WA	Australia	-28.60726	122.3968	352	-25.55	-30.55	-8.2	17.80491559	18.3	461	385.6	Angiosperm
Murphy et al., 2009	Tindarey NSW	Australia	-31.07485	145.91124	352	-26.01	-31.01	-8.2	18.28560868	18.3	205	385.6	Angiosperm
Murphy et al., 2009	Lanitza NSW	Australia	-29.89585	152.98521	1135	-30.34	-35.34	-8.2	22.8327455	18.3	89	385.6	Angiosperm
Murphy et al., 2009	Lanitza NSW	Australia	-29.89585	152.98521	1135	-30.81	-35.81	-8.2	23.32875907	18.3	252	385.6	Angiosperm
Murphy et al., 2009	Paynes Find WA	Australia	-28.99598	117.78846	253	-28.95	-33.95	-8.2	21.3686216	19.7	339	385.6	Angiosperm
Murphy et al., 2009	Eurardy WA	Australia	-29.58478	115.14848	503	-29.3	-34.3	-8.2	21.7368909	19.7	330	385.6	Angiosperm
Murphy et al., 2009	Tindarey NSW	Australia	-31.07485	145.91124	217	-24.62	-29.62	-8.2	16.83446452	19.9	204	385.6	Angiosperm
Murphy et al., 2009	Laverton	Australia	-28.60726	122.3968	217	-27.43	-32.43	-8.2	19.77235572	19.9	461	385.6	Angiosperm

Murphy et al., 2009	St George	Australia	-27.90805	148.70703	506	-26.36	-31.36	-8.2	18.6516577	19.9	201	385.6	Angiosperm
Murphy et al., 2009	St George QLD	Australia	-27.90805	148.70703	506	-27.19	-32.19	-8.2	19.52076973	19.9	201	385.6	Angiosperm
Murphy et al., 2009	St George QLD	Australia	-27.90805	148.70703	506	-27.69	-32.69	-8.2	20.04504736	19.9	201	385.6	Angiosperm
Murphy et al., 2009	Bollon QLD	Australia	-27.96495	147.80576	441	-27.41	-32.41	-8.2	19.75138548	20.1	183	385.6	Angiosperm
Murphy et al., 2009	Eurardy WA	Australia	-27.31513	114.60386	281	-26.78	-31.78	-8.2	19.09126405	20.2	330	385.6	Angiosperm
Murphy et al., 2009	Welbourn Hill SA	Australia	-27.45278	133.7315	184	-27.3	-32.3	-8.2	19.63606456	20.5	311	385.6	Angiosperm
Murphy et al., 2009	Anmatjere NT	Australia	-22.9942	133.5812	288	-28.22	-33.22	-8.2	20.60137068	20.9	659	385.6	Angiosperm
Murphy et al., 2009	Wiluna	Australia	-26.631	120.20998	222	-28.63	-33.63	-8.2	21.03215047	21.2	521	385.6	Angiosperm
Murphy et al., 2009	Hamelin Pool	Australia	-26.58355	114.5275	223	-23.74	-28.74	-8.2	15.91789073	21.3	97	385.6	Angiosperm
Murphy et al., 2009	Lake Austin	Australia	-27.33306	117.94653	209	-26.64	-31.64	-8.2	18.94468645	21.4	150	385.6	Angiosperm
Murphy et al., 2009	Mission River	Australia	-12.7334	142.37083	1539	-28.81	-33.81	-8.2	21.22138819	25.8	44	385.6	Angiosperm
Murphy et al., 2009	Baines NT	Australia	-15.76618	130.02673	762	-28.02	-33.02	-8.2	20.39136608	27.2	37	385.6	Angiosperm
Nagy and Proctor, 2000	Muara Joloi	Indonesia	-0.07	114.0166667	3700	-30.77584785	-35.77584785	-7.85	23.65381404	25.7	300	368.38	Angiosperm

Pfautsch et al., 2010	Melbourne	Australia	-37.70833333	145.6933333	1760	-29.6	-34.6	-7.61	22.66075845	0.818333	511	387.83	Mixed
Pfautsch et al., 2010	Melbourne	Australia	-37.70833333	145.6933333	1980	-29.2	-34.2	-7.61	22.23939019	0.818333	727	387.83	Mixed
Pfautsch et al., 2010	Melbourne	Australia	-37.70833333	145.6933333	2220	-29.3	-34.3	-7.61	22.3446997	0.818333	968	387.83	Mixed
Sandquist and Cordell, 2007	Kailua-Kona	USA	19.77	-155.9383333	487.1	-26.56099146	-31.56099146	-8.05	19.01607732	22.2	655	381.9	Angiosperm
Schulze average 150-200	Laverton	Australia	-27.82583333	124.5251958	179.46	-26.69374441	-31.69374441	-8.07	19.1345163	N.A.	460.375	N.A.	N.A.
Schulze average 200-250	Bullabulling WA	Australia	-31.11416667	120.95215	215.62	-26.31119379	-31.31119379	-8.07	18.73411061	N.A.	402.25	N.A.	N.A.
Schulze et al., 1996	Hardap	Namibia	-23.5	17	50	-26.2	-31.2	-7.43	19.27500513	19.9	400	360.82	Angiosperm
Schulze et al., 1996	Hardap	Namibia	-23.5	17	350	-26.7	-31.7	-7.43	19.79862324	19.9	1000	360.82	Angiosperm
Schulze et al., 1996	Hardap	Namibia	-23.5	17	450	-26.8	-31.8	-7.43	19.90341143	19.9	1000	360.82	Angiosperm
Schulze et al., 1996	Hardap	Namibia	-23.5	17	550	-26.8	-31.8	-7.43	19.90341143	19.9	1000	360.82	Angiosperm
Schulze et al., 1998	Mount Zeil	Australia	-23.66666667	132.35	216	-25.54027505	-30.54027505	-7.84	18.16419355	20.57	780	363.7	Angiosperm
Schulze et al., 1998	Petermann	Australia	-25.23333333	130.35	310	-25.1572327	-30.1572327	-7.84	17.76412903	21.2	560	363.7	Angiosperm
Schulze et al., 1998	Ngaanyatjarra-Giles	Australia	-25.08333333	128.35	245	-24.86975327	-29.86975327	-7.84	17.46408065	22.44	480	363.7	Angiosperm

Schulze et al., 1998	Lake MacKay	Australia	-23.29166667	129.6166667	329	-25.9230165	-30.9230165	-7.84	18.56425806	23.12	470	363.7	Angiosperm
Schulze et al., 1998	Davenport	Australia	-20.74166667	134.1833333	342	-26.01865488	-31.01865488	-7.84	18.66427419	24.94	355	363.7	Angiosperm
Schulze et al., 1998	Pamayu	Australia	-17.73333333	133.6333333	485	-27.16485241	-32.16485241	-7.84	19.86446774	26.61	225	363.7	Angiosperm
Schulze et al., 1998	Victoria River	Australia	-17.3	130.75	472	-26.68759812	-31.68759812	-7.84	19.3643871	26.68	215	363.7	Angiosperm
Schulze et al., 1998	Nitmiluk	Australia	-14.3	132.0833333	970	-26.3054574	-31.3054574	-7.84	18.96432258	26.86	175	363.7	Angiosperm
Schulze et al., 1998	Gregory	Australia	-15.58333333	131.1	803	-26.87855601	-31.87855601	-7.84	19.56441935	26.87	180	363.7	Angiosperm
Schulze et al., 1998	Victoria Rive	Australia	-16.11666667	130.9166667	590	-27.83222266	-32.83222266	-7.84	20.56458065	27.2	100	363.7	Angiosperm
Schulze et al., 1998	Marrara	Australia	-12.41666667	130.8666667	1693	-26.78308643	-31.78308643	-7.84	19.46440323	27.39	5	363.7	Angiosperm
Schulze et al., 1998	Tiwi Islands	Australia	-11.75	130.8666667	1801	-27.45098039	-32.45098039	-7.84	20.16451613	27.39	45	363.7	Angiosperm
Schulze et al., 1998	Kakadu	Australia	-12.68333333	132.3833333	1344	-26.97400687	-31.97400687	-7.84	19.66443548	27.62	35	363.7	Angiosperm
Schulze et al., 2006	North Walpole	Australia	-34.91666667	116.6888333	1018.7	-28.81	-33.81	-8.07	21.3552446	14.75	111	379.8	Angiosperm
Schulze et al., 2006	Narrikup	Australia	-34.75	117.5058333	1017.5	-28	-33	-8.07	20.50411523	15.14	108	379.8	Angiosperm
Schulze et al., 2006	Stirling Range National Park	Australia	-34.38333333	117.7791667	478.2	-27.36777778	-32.36777778	-8.07	19.84077572	15.35	264	379.8	Angiosperm

Schulze et al., 2006	Walpole	Australia	-34.96666667	116.7916667	1017.5	-28.47666667	-33.47666667	-8.07	21.00481375	15.52	169	379.8	Angiosperm
Schulze et al., 2006	Yeagarup	Australia	-34.48333333	115.9516667	1050	-27.21333333	-32.21333333	-8.07	19.67886073	15.57	170	379.8	Angiosperm
Schulze et al., 2006	Yeagarup	Australia	-34.51666667	116.0083333	1050	-27.96666667	-32.96666667	-8.07	20.46911971	15.57	120	379.8	Angiosperm
Schulze et al., 2006	Magitup	Australia	-34.15	118.235	275.6	-27.01666667	-32.01666667	-8.07	19.47275561	15.64	195	379.8	Angiosperm
Schulze et al., 2006	Mindarabin	Australia	-33.91666667	118.3291667	275.6	-27.01	-32.01	-8.07	19.46577046	15.85	327	379.8	Angiosperm
Schulze et al., 2006	North Lake Grace	Australia	-33.03333333	118.4725	1018.7	-28.485	-33.485	-8.07	21.01357159	16.23	169	379.8	Angiosperm
Schulze et al., 2006	Ludlow	Australia	-33.56666667	115.5	662	-26.92	-31.92	-8.07	19.37148025	16.84	7	379.8	Angiosperm
Schulze et al., 2006	Myalup	Australia	-33	115.7416667	662	-27.18333333	-32.18333333	-8.07	19.64741558	17.09	27	379.8	Angiosperm
Schulze et al., 2006	Gorrie	Australia	-31.88333333	116.25	772.3	-27.42666667	-32.42666667	-8.07	19.90252663	17.52	280	379.8	Angiosperm
Schulze et al., 2006	Gorrie	Australia	-31.88333333	116.2625	772.3	-28.39777778	-33.39777778	-8.07	20.92191363	17.52	278	379.8	Angiosperm
Schulze et al., 2006	Gorrie	Australia	-31.88333333	116.5583333	445.7	-27.00333333	-32.00333333	-8.07	19.4587854	17.7	351	379.8	Angiosperm
Schulze et al., 2006	Yanchep	Australia	-31.53333333	115.675	583.8	-27.3	-32.3	-8.07	19.76971317	18.53	26	379.8	Angiosperm
Song et al., 2008	Yushu	China	34	93	42	-24.275	-29.275	-8.12	16.55691921	-3.521	3000	383.79	Angiosperm
Song et al., 2008	Yushu	China	34	93	80	-24.06666	-29.066666	-8.12	16.33991393	-3.521	3000	383.79	Angiosperm

						667	67						
Song et al., 2008	Yushu	China	34	93	120	-24.85	-29.85	-8.12	17.15633492	-3.521	3500	383.79	Angiosperm
Song et al., 2008	Yushu	China	34	93	160	-25.375	-30.375	-8.12	17.70424522	-3.521	3500	383.79	Angiosperm
Song et al., 2008	Yushu	China	34	93	180	-24.3	-29.3	-8.12	16.58296608	-3.521	3500	383.79	Angiosperm
Song et al., 2008	Yushu	China	34	93	180	-24.675	-29.675	-8.12	16.97382924	-3.521	3500	383.79	Angiosperm
Song et al., 2008	Yushu	China	34	93	200	-24.8	-29.8	-8.12	17.10418376	-3.521	3500	383.79	Angiosperm
Song et al., 2008	Yushu	China	34	93	225	-24.6	-29.6	-8.12	16.89563256	-3.521	3500	383.79	Angiosperm
Song et al., 2008	Yushu	China	34	93	250	-25.65	-30.65	-8.12	17.9914815	-3.521	3500	383.79	Angiosperm
Song et al., 2008	Yushu	China	34	93	260	-25.2	-30.2	-8.12	17.52154288	-3.521	3500	383.79	Angiosperm
Song et al., 2008	Yushu	China	34	93	275	-25.2375	-30.2375	-8.12	17.56068786	-3.521	3500	383.79	Angiosperm
Song et al., 2008	Yushu	China	34	93	290	-25.7	-30.7	-8.12	18.0437237	-3.521	3500	383.79	Angiosperm
Song et al., 2008	Yushu	China	34	93	350	-26.1	-31.1	-8.12	18.4618544	-3.521	4000	383.79	Angiosperm
Song et al., 2008	Yushu	China	34	93	360	-25.3	-30.3	-8.12	17.62593619	-3.521	4000	383.79	Angiosperm
Song et al., 2008	Yushu	China	34	93	380	-26.15	-31.15	-8.12	18.51414489	-3.521	4000	383.79	Angiosperm
Song et al., 2008	Yushu	China	34	93	410	-25.45	-30.45	-8.12	17.78256631	-3.521	4000	383.79	Angiosperm
Song et al., 2008	Yushu	China	34	93	450	-26.02142857	-31.02142857	-8.12	18.37969448	-3.521	4000	383.79	Angiosperm
Song et al., 2008	Yushu	China	34	93	460	-26.275	-31.275	-8.12	18.64489461	-3.521	4000	383.79	Angiosperm
Song et al., 2008	Yushu	China	34	93	475	-26.15	-31.15	-8.12	18.51414489	-3.521	4000	383.79	Angiosperm
Song et al., 2008	Yushu	China	34	93	490	-25.85	-30.85	-8.12	18.20048247	-3.521	4000	383.79	Angiosperm
Song et al., 2008	Yushu	China	34	93	550	-27.6	-32.6	-8.12	20.03290827	-3.521	4000	383.79	Angiosperm

Song et al., 2008	Yushu	China	34	93	570	-25.8	-30.8	-8.12	18.14822418	-3.521	4000	383.79	Angiosperm
Song et al., 2008	Yushu	China	34	93	660	-26.4	-31.4	-8.12	18.7756779	-3.521	4000	383.79	Angiosperm
Song et al., 2008	Yushu	China	34	93	670	-27.14545455	-32.14545455	-8.12	19.55631973	-3.521	4000	383.79	Angiosperm
Song et al., 2008	Yushu	China	34	93	780	-26	-31	-8.12	18.35728953	-3.521	4000	383.79	Angiosperm
Song et al., 2008	Yushu	China	34	93	800	-26.6	-31.6	-8.12	18.98500103	-3.521	4000	383.79	Angiosperm
Song et al., 2008	Yushu	China	34	93	850	-26.75	-31.75	-8.12	19.14204983	-3.521	4000	383.79	Angiosperm
Song et al., 2008	Yushu	China	34	93	880	-26.4	-31.4	-8.12	18.7756779	-3.521	4000	383.79	Angiosperm
Song et al., 2008	Yushu	China	34	93	960	-29	-34	-8.12	21.50360453	-3.521	4000	383.79	Angiosperm
Song et al., 2008	Yushu	China	34	93	1275	-29.05	-34.05	-8.12	21.55620784	-3.521	4000	383.79	Angiosperm
Song et al., 2008	Yushu	China	34	93	1520	-28.65	-33.65	-8.12	21.13553302	-3.521	4000	383.79	Angiosperm
Song et al., 2008	Yushu	China	34	93	1730	-30.1	-35.1	-8.12	22.66213012	-3.521	4000	383.79	Angiosperm
Song et al., 2008	Yushu	China	34	93	1820	-29.2	-34.2	-8.12	21.71405027	-3.521	4000	383.79	Angiosperm
Song et al., 2008	Yushu	China	34	93	1860	-28.85	-33.85	-8.12	21.34582711	-3.521	4000	383.79	Angiosperm
Song et al., 2008	Yushu	China	34	93	1930	-29.1	-34.1	-8.12	21.60881656	-3.521	4000	383.79	Angiosperm
Song et al., 2008	Yushu	China	34	93	2000	-28.45	-33.45	-8.12	20.92532551	-3.521	4000	383.79	Angiosperm
Song et al., 2008	Yushu	China	34	93	2130	-29.5	-34.5	-8.12	22.0298815	-3.521	4000	383.79	Angiosperm
Song et al., 2008	Yushu	China	34	93	2260	-28.85	-33.85	-8.12	21.34582711	-3.521	4000	383.79	Angiosperm
Song et al., 2008	Yushu	China	34	93	2330	-29	-34	-8.12	21.50360453	-3.521	4000	383.79	Angiosperm
Song et al., 2008	Yushu	China	34	93	2410	-28.2	-33.2	-8.12	20.6626878	-3.521	4000	383.79	Angiosperm
Stewart	Carneys	Australia	-28.2	152.5	1199	-30	-35	-7.84	22.84536	16.75	650	358.83	Angiospe

et al., 1995	Creek QLD								082				rm
Stewart et al., 1995	Bunya Mountains QLD	Australia	-26.8	151.5	672	-28	-33	-7.84	20.74074074	18.32	800	358.83	Angiosperm
Stewart et al., 1995	Limpinwood	Australia	-28.3	153.2	1645	-31.2	-36.2	-7.84	24.11230388	18.5	250	358.83	Angiosperm
Stewart et al., 1995	Kholo QLD	Australia	-27.7	152.4	836	-28.9	-33.9	-7.84	21.68674699	18.72	250	358.83	Angiosperm
Stewart et al., 1995	Lake Wivenhoe QLD	Australia	-27.2	152.5	822	-27.2	-32.2	-7.84	19.90131579	18.76	65	358.83	Angiosperm
Stewart et al., 1995	Glass House Mountains	Australia	-26.9	152.9	1616	-29.3	-34.3	-7.84	22.10775729	19.36	85	358.83	Angiosperm
Stewart et al., 1995	Dundas	Australia	-27.3	152.7	1687	-30.6	-35.6	-7.84	23.47844027	19.46	375	358.83	Angiosperm
Stewart et al., 1995	Yarrabilba QLD	Australia	-27.8	153.1	1244	-28.9	-33.9	-7.84	21.68674699	19.87	55	358.83	Angiosperm
Stewart et al., 1995	Kholo QLD	Australia	-27.5	152.8	882	-27.3	-32.3	-7.84	20.0061684	19.98	135	358.83	Angiosperm
Stewart et al., 1995	Kholo QLD	Australia	-27.5	152.8	1246	-28.7	-33.7	-7.84	21.47637187	19.98	115	358.83	Angiosperm
Stewart et al., 1995	Hungerford QLD	Australia	-28.8	144.6	294	-26.6	-31.6	-7.84	19.27265256	21.22	140	358.83	Angiosperm
Stewart et al., 1995	Blackall QLD	Australia	-24.5	145	450	-25.6	-30.6	-7.84	18.22660099	22.2	275	358.83	Angiosperm
Swap et al., 2004	Rustenburg	South Africa	-25.6	27.2	650	-26.7	-31.7	-8.04	19.17188945	20	1165	375.8	Mixed
Swap et al., 2004	Ghanzi	Botswana	-22.41	21.71	407	-27.2	-32.2	-8.04	19.69572368	20.6	1082	375.8	Mixed
Swap et	Kruger	South	-25.17	31.27	650	-25.7	-30.7	-8.04	18.12583	22.4	580	375.8	Mixed

al., 2004	Park	Africa							393				
Swap et al., 2004	Oshikoto Region	Namibia	-19	16	340	-24.6	-29.6	-8.04	16.97765019	22.5	1100	375.8	Mixed
Swap et al., 2004	Lukulu	Zambia	-14.42	23.52	970	-28	-33	-8.04	20.53497942	22.63888889	1060	375.8	Mixed
Swap et al., 2004	Shangombo	Zambia	-16.74	23.61	740	-27.8	-32.8	-8.04	20.325036	23.05555556	1015	375.8	Mixed
Swap et al., 2004	Senanga	Zambia	-15.86	23.34	810	-26.9	-31.9	-8.04	19.38135854	23.05555556	1045	375.8	Mixed
Swap et al., 2004	Benede	South Africa	-27.75	21.42	230	-23.2	-28.2	-8.04	15.52006552	23.5	940	375.8	Mixed
Swap et al., 2004	Omaheke Region	Namibia	-22.02	19.17	410	-26.2	-31.2	-8.04	18.64859314	23.5	1518	375.8	Mixed
Swap et al., 2004	Ngamiland East	Botswana	-19.92	23.59	460	-26.8	-31.8	-8.04	19.27661323	24.44444444	945	375.8	Mixed
Swap et al., 2004	Grootfontein	Namibia	-19.6	18.1	390	-26	-31	-8.04	18.43942505	25.4	1410	375.8	Mixed
Terwilliger, 1997	Panamá Oeste	Panama	8.97	-79.63333333	1809.48	-30.13	-35.13	-7.89	22.93090827	26.7	85	362.61	Angiosperm
Toft et al., 1989	Idaho Falls	USA	43.5	-112.05	224	-26.6	-31.6	-7.62	19.49866448	7.6	1505	351.57	Angiosperm
Uemura et al., 2006	Tabitomachi Kaidomari	Japan	36.97	140.6	1601	-27.43339574	-32.43339574	-8.05	19.93014736	9.5	700	379.8	Angiosperm
Valentini et al., 1992	Cortina d'Ampezzo	Italy	46.53	12.13	919.44	-27.10098674	-32.10098674	-7.79	19.84891184	2.1	1000	357.1	Mixed
Valentini et al., 1992	Castello Lavazzo BL	Italy	46.33	12.32	1198.44	-28.36691599	-33.36691599	-7.79	21.17766091	3.8	1500	357.1	Mixed
Valentini et al., 1992	Pescia Romana VT	Italy	42.37	11.53333333	860	-26.13	-31.13	-7.77	18.85261893	16	4	357.1	Mixed
Van de water et al., 2002	Utah	USA	37.3731	109.5229	550	-24.9	-29.9	-8.05	17.28027895	0.436667	1800	371.14	Mixed
Van de water et al., 2002	Utah	USA	37.3731	109.5229	550	-25	-30	-8.05	17.38461538	0.436667	1800	371.14	Mixed

Van de water et al., 2002	Utah	USA	37.3731	109.5229	550	-25.1	-30.1	-8.05	17.48897323	0.436667	1800	371.14	Mixed
Van de water et al., 2002	Utah	USA	37.3731	109.5229	550	-25.3	-30.3	-8.05	17.69775315	0.436667	1800	371.14	Mixed
Wang et al., 2008	Xilingereqi	China	43.63	116.7	350	-26.4	-31.4	-7.8	19.10435497	0.2	1255	383.79	Angiosperm
Wang et al., 2008	Huangzhong	China	36.55	101.52	380	-26.6	-31.6	-7.8	19.31374563	3	2473	383.79	Angiosperm
Wang et al., 2008	Sunan	China	38.81	99.63	280	-25.9	-30.9	-7.8	18.58125449	3.6	2584	383.79	Angiosperm
Wang et al., 2008	Shenmu	China	38.81	110.27	440	-28.1	-33.1	-7.8	20.88692252	5.3	1239	383.79	Angiosperm
Wang et al., 2008	Dongsheng2	China	39.75	109.95	380	-26.8	-31.8	-7.8	19.52322236	5.5	1457	383.79	Angiosperm
Wang et al., 2008	Dongsheng1	China	39.81	110.8	380	-27.2	-32.2	-7.8	19.94243421	5.6	1176	383.79	Angiosperm
Wang et al., 2008	Shandan	China	38.16	101.38	180	-26.1	-31.1	-7.8	18.79043023	5.7	2636	383.79	Angiosperm
Wang et al., 2008	Yijingheluoqi	China	39.21	109.78	358	-27.3	-32.3	-7.8	20.04729105	6.2	1264	383.79	Angiosperm
Wang et al., 2008	Dingxi	China	35.62	104.56	480	-27.6	-32.6	-7.8	20.36199095	6.2	1900	383.79	Angiosperm
Wang et al., 2008	Hequ	China	39.42	111.21	494	-27.8	-32.8	-7.8	20.57189879	6.3	933	383.79	Angiosperm
Wang et al., 2008	Lanzhou	China	36	103.83	327	-26.4	-31.4	-7.8	19.10435497	6.6	1918	383.79	Angiosperm
Wang et al., 2008	Yuzhong	China	35.94	104.09	380	-26.2	-31.2	-7.8	18.89505032	6.6	1915	383.79	Angiosperm
Wang et al., 2008	Zhungereqi	China	39.72	111.16	400	-26.7	-31.7	-7.8	19.41847324	7.2	1183	383.79	Angiosperm
Wang et al., 2008	Alxa Zuoqi	China	38.5	105.6	150	-23	-28	-7.8	15.55783009	7.8	1300	383.79	Angiosperm
Wang et al., 2008	Baiyin	China	36.55	104.1	194	-26.2	-31.2	-7.8	18.89505032	8	1879	383.79	Angiosperm
Wang et al., 2008	Yulin	China	38.5	109.65	365	-27.3	-32.3	-7.8	20.04729105	8	1171	383.79	Angiosperm
Wang et al., 2008	Jingtai	China	37.05	104.01	184	-23.5	-28.5	-7.8	16.07782898	8.3	1729	383.79	Angiosperm

Wang et al., 2008	Tongxin	China	37	105.8	277	-27.9	-32.9	-7.8	20.67688509	8.4	1454	383.79	Angiosperm
Wang et al., 2008	Zhongwei	China	37.45	104.63	186	-25.8	-30.8	-7.8	18.47669883	8.5	1572	383.79	Angiosperm
Wang et al., 2008	Yinchuan	China	38.55	106.5	202	-26	-31	-7.8	18.68583162	8.5	1104	383.79	Angiosperm
Wang et al., 2008	Guyuan	China	36	106.27	478	-26	-31	-7.8	18.68583162	8.5	1730	383.79	Angiosperm
Wang et al., 2008	Linxia	China	35	103.2	501	-27.3	-32.3	-7.8	20.04729105	8.6	3552	383.79	Angiosperm
Wang et al., 2008	Pingliang	China	35.55	106.67	511	-27.5	-32.5	-7.8	20.25706941	8.8	1486	383.79	Angiosperm
Wang et al., 2008	Ansai	China	36.75	109.33	531	-26.7	-31.7	-7.8	19.41847324	8.9	1260	383.79	Angiosperm
Wang et al., 2008	XIfeng	China	35.7	107.67	594	-27.7	-32.7	-7.8	20.46693407	8.9	1132	383.79	Angiosperm
Wang et al., 2008	Ziwuling	China	36.1	108.7	600	-27.8	-32.8	-7.8	20.57189879	9	1197	383.79	Angiosperm
Wang et al., 2008	Changwu	China	35.2	107.33	584	-27.4	-32.4	-7.8	20.15216944	9.1	1322	383.79	Angiosperm
Wang et al., 2008	Zhongning	China	37.5	105.7	223	-26	-31	-7.8	18.68583162	9.2	1183	383.79	Angiosperm
Wang et al., 2008	Luochuan	China	35.7	109.4	621	-27.8	-32.8	-7.8	20.57189879	9.2	1067	383.79	Angiosperm
Wang et al., 2008	Huangling	China	35.6	109.25	631	-26.4	-31.4	-7.8	19.10435497	9.4	883	383.79	Angiosperm
Wang et al., 2008	Fengxian	China	33.98	106.5	613	-27.1	-32.1	-7.8	19.83759893	11.4	1178	383.79	Angiosperm
Wang et al., 2008	Gaochang	China	42.9	89.5	150.6	-26.5	-31.5	-7.8	19.20903955	13.9	10	383.79	Angiosperm
Wang et al., 2010	Ghanzi	Africa	-21.39	21.49	424	-25.9	-30.9	-8.2	18.17061903	23.7	1156	387.43	Angiosperm
Wang et al., 2010	Mongu	Africa	-15.26	23.15	879	-28.2	-33.2	-8.2	20.58036633	25.4	1053	387.43	Angiosperm
Wang et al., 2010	Pandamatenga	Africa	-18.4	25.3	424	-27.1	-32.1	-8.2	19.42645698	26.7	1069	387.43	Angiosperm
Weiguo et al., 2005	Mongolia	China	47.66	119.29	387.01	-26.1	-31.1	-8.5	18.0716706	-1.27	1450	377.52	Angiosperm
Weiguo	Mongolia	China	47.66	119.29	387.01	-27.4	-32.4	-8.5	19.43244	-1.27	1450	377.52	Angiospe

et al., 2005									911				rm
Weiguo et al., 2005	Mongolia	China	49.43	118.8	381.97	-26.2	-31.2	-8.5	18.17621688	-0.5147	1450	377.52	Angiosperm
Weiguo et al., 2005	Mongolia	China	49.43	118.8	381.97	-26.4	-31.4	-8.5	18.38537387	-0.5147	1450	377.52	Angiosperm
Weiguo et al., 2005	Mongolia	China	48.78	119.46	397.19	-26.2	-31.2	-8.5	18.17621688	-0.3645	1450	377.52	Angiosperm
Weiguo et al., 2005	Mongolia	China	48.78	119.46	397.19	-26.7	-31.7	-8.5	18.69927052	-0.3645	1450	377.52	Angiosperm
Weiguo et al., 2005	Mongolia	China	47.84	118.92	387.33	-26.4	-31.4	-8.5	18.38537387	-0.2408	1450	377.52	Angiosperm
Weiguo et al., 2005	Mongolia	China	47.84	118.92	387.33	-27	-32	-8.5	19.01336074	0.2408	1450	377.52	Angiosperm
Weiguo et al., 2005	Mongolia	China	48.77	117.83	348.28	-25.3	-30.3	-8.5	17.23607264	0.5049	1450	377.52	Angiosperm
Weiguo et al., 2005	Mongolia	China	48.77	117.83	348.28	-26.5	-31.5	-8.5	18.48998459	0.5049	1450	377.52	Angiosperm
Weiguo et al., 2005	Mongolia	China	48.45	117.31	330.89	-25.8	-30.8	-8.5	17.75816054	1.177	1450	377.52	Angiosperm
Weiguo et al., 2005	Mongolia	China	48.45	117.31	330.89	-26.9	-31.9	-8.5	18.90864248	1.177	1450	377.52	Angiosperm
Weiguo et al., 2005	Mongolia	China	44.02	116.21	335.8	-24.6	-29.6	-8.5	16.5060488	2.318	1450	377.52	Angiosperm
Weiguo et al., 2005	Mongolia	China	43.72	113.53	265.77	-23.9	-28.9	-8.5	15.77707202	4.065	1450	377.52	Angiosperm
Weiguo et al.,	Qingcheng	China	36	108	240	-25.6	-30.6	-8.05	18.01108374	10.28	1450	377.52	Angiosperm

2005													
Weiguo et al., 2005	Qingcheng	China	36	108	245	-26	-31	-8.05	18.42915811	10.28	1450	377.52	Angiosperm
Weiguo et al., 2005	Qingcheng	China	36	108	280	-24.4	-29.4	-8.05	16.75891759	10.28	1450	377.52	Angiosperm
Weiguo et al., 2005	Qingcheng	China	36	108	300	-26.8	-31.8	-8.05	19.26633785	10.28	1450	377.52	Angiosperm
Weiguo et al., 2005	Qingcheng	China	36	108	340	-26.4	-31.4	-8.05	18.84757601	10.28	1450	377.52	Angiosperm
Weiguo et al., 2005	Qingcheng	China	36	108	350	-25.9	-30.9	-8.05	18.32460733	10.28	1450	377.52	Angiosperm
Weiguo et al., 2005	Qingcheng	China	36	108	370	-25.1	-30.1	-8.05	17.48897323	10.28	1450	377.52	Angiosperm
Weiguo et al., 2005	Qingcheng	China	36	108	380	-25.9	-30.9	-8.05	18.32460733	10.28	1450	377.52	Angiosperm
Weiguo et al., 2005	Qingcheng	China	36	108	385	-26.5	-31.5	-8.05	18.95223421	10.28	1450	377.52	Angiosperm
Weiguo et al., 2005	Qingcheng	China	36	108	395	-25.6	-30.6	-8.05	18.01108374	10.28	1450	377.52	Angiosperm
Weiguo et al., 2005	Qingcheng	China	36	108	410	-25.9	-30.9	-8.05	18.32460733	10.28	1450	377.52	Angiosperm
Weiguo et al., 2005	Qingcheng	China	36	108	420	-26.7	-31.7	-8.05	19.16161512	10.28	1450	377.52	Angiosperm
Weiguo et al., 2005	Qingcheng	China	36	108	430	-26.3	-31.3	-8.05	18.7429393	10.28	1450	377.52	Angiosperm
Weiguo et al., 2005	Qingcheng	China	36	108	440	-26.7	-31.7	-8.05	19.16161512	10.28	1450	377.52	Angiosperm

Weiguo et al., 2005	Qingcheng	China	36	108	450	-27.5	-32.5	-8.05	20	10.28	1450	377.52	Angiosperm
Weiguo et al., 2005	Qingcheng	China	36	108	460	-27.5	-32.5	-8.05	20	10.28	1450	377.52	Angiosperm
Weiguo et al., 2005	Qingcheng	China	36	108	470	-26.9	-31.9	-8.05	19.37108211	10.28	1450	377.52	Angiosperm
Weiguo et al., 2005	Qingcheng	China	36	108	480	-27.1	-32.1	-8.05	19.58063521	10.28	1450	377.52	Angiosperm
Weiguo et al., 2005	Qingcheng	China	36	108	490	-27.1	-32.1	-8.05	19.58063521	10.28	1450	377.52	Angiosperm
Weiguo et al., 2005	Qingcheng	China	36	108	505	-29	-34	-8.05	21.57569516	10.28	1450	377.52	Angiosperm
Weiguo et al., 2005	Qingcheng	China	36	108	510	-26.8	-31.8	-8.05	19.26633785	10.28	1450	377.52	Angiosperm
Weiguo et al., 2005	Qingcheng	China	36	108	515	-27.1	-32.1	-8.05	19.58063521	10.28	1450	377.52	Angiosperm
Weiguo et al., 2005	Qingcheng	China	36	108	520	-27.1	-32.1	-8.05	19.58063521	10.28	1450	377.52	Angiosperm
Weiguo et al., 2005	Qingcheng	China	36	108	525	-27.3	-32.3	-8.05	19.79027449	10.28	1450	377.52	Angiosperm
Weiguo et al., 2005	Qingcheng	China	36	108	535	-27.6	-32.6	-8.05	20.1048951	10.28	1450	377.52	Angiosperm
Weiguo et al., 2005	Qingcheng	China	36	108	540	-27.2	-32.2	-8.05	19.68544408	10.28	1450	377.52	Angiosperm
Weiguo et al., 2005	Qingcheng	China	36	108	550	-27	-32	-8.05	19.47584789	10.28	1450	377.52	Angiosperm
Weiguo	Qingcheng	China	36	108	585	-27.2	-32.2	-8.05	19.68544	10.28	1450	377.52	Angiospe

et al., 2005									408				rm
Weiguo et al., 2005	Qingcheng	China	36	108	590	-27.5	-32.5	-8.05	20	10.28	1450	377.52	Angiosperm
Weiguo et al., 2005	Qingcheng	China	36	108	640	-26.2	-31.2	-8.05	18.63832409	10.28	1450	377.52	Angiosperm
Weiguo et al., 2005	Qingcheng	China	36	108	650	-26.9	-31.9	-8.05	19.37108211	10.28	1450	377.52	Angiosperm
Weiguo et al., 2005	Qingcheng	China	36	108	670	-27.2	-32.2	-8.05	19.68544408	10.28	1450	377.52	Angiosperm
Yang et al., 2015	Tibetan plateau	China	33.45	91.03	320.51	-25.786	-30.786	-8.5	17.74353479	-3.09	N.A.	398.65	Angiosperm
Yang et al., 2015	Tibetan plateau	China	33.45	91.03	325.81	-26.29	-31.29	-8.5	18.27032689	-2.97	N.A.	398.65	Angiosperm
Yang et al., 2015	Tibetan plateau	China	33.45	91.03	325.18	-25.57	-30.57	-8.5	17.51793356	-2.96	N.A.	398.65	Angiosperm
Yang et al., 2015	Tibetan plateau	China	33.45	91.03	332.37	-25.794	-30.794	-8.5	17.75189231	-2.83	N.A.	398.65	Angiosperm
Yang et al., 2015	Tibetan plateau	China	33.45	91.03	332.56	-25.567	-30.567	-8.5	17.51480091	-2.81	N.A.	398.65	Angiosperm
Yang et al., 2015	Tibetan plateau	China	33.45	91.03	307.88	-25.17	-30.17	-8.5	17.10041751	-2.79	N.A.	398.65	Angiosperm
Yang et al., 2015	Tibetan plateau	China	33.45	91.03	346.19	-23.97	-28.97	-8.5	15.84992265	-2.59	N.A.	398.65	Angiosperm
Yang et al., 2015	Tibetan plateau	China	33.45	91.03	346.19	-25.479	-30.479	-8.5	17.42291854	-2.59	N.A.	398.65	Angiosperm
Yang et al., 2015	Tibetan plateau	China	33.45	91.03	350.16	-26.093	-31.093	-8.5	18.06435317	-2.46	N.A.	398.65	Angiosperm
Yang et al., 2015	Tibetan plateau	China	33.45	91.03	274.77	-26.329	-31.329	-8.5	18.3111133	-2.2	N.A.	398.65	Angiosperm
Yang et al., 2015	Tibetan plateau	China	33.45	91.03	361.42	-24.94	-29.94	-8.5	16.86050089	-2.15	N.A.	398.65	Angiosperm
Yang et al., 2015	Tibetan plateau	China	33.45	91.03	291.26	-24.677	-29.677	-8.5	16.58630013	-2.07	N.A.	398.65	Angiosperm
Yang et al., 2015	Tibetan plateau	China	33.45	91.03	291.26	-25.184	-30.184	-8.5	17.11502478	-2.07	N.A.	398.65	Angiosperm

Yang et al., 2015	Tibetan plateau	China	33.45	91.03	277.29	-24.77	-29.77	-8.5	16.68324395	-1.56	N.A.	398.65	Angiosperm
Yang et al., 2015	Tibetan plateau	China	33.45	91.03	405.87	-25.54	-30.54	-8.5	17.48660797	-0.94	N.A.	398.65	Angiosperm
Yang et al., 2015	Tibetan plateau	China	33.45	91.03	278.63	-25.164	-30.164	-8.5	17.09415738	-0.55	N.A.	398.65	Angiosperm
Yang et al., 2015	Tibetan plateau	China	33.45	91.03	363.9	-26.191	-31.191	-8.5	18.16680684	-0.53	N.A.	398.65	Angiosperm
Yang et al., 2015	Tibetan plateau	China	33.45	91.03	349.18	-25.618	-30.618	-8.5	17.56805852	-0.52	N.A.	398.65	Angiosperm
Yang et al., 2015	Tibetan plateau	China	33.45	91.03	352.64	-26.63	-31.63	-8.5	18.62601066	-0.5	N.A.	398.65	Angiosperm
Yang et al., 2015	Tibetan plateau	China	33.45	91.03	485.18	-25.72	-30.72	-8.5	17.67459047	-0.48	N.A.	398.65	Angiosperm
Yang et al., 2015	Tibetan plateau	China	33.45	91.03	336.79	-25.75	-30.75	-8.5	17.70592764	-0.39	N.A.	398.65	Angiosperm
Yang et al., 2015	Tibetan plateau	China	33.45	91.03	418.01	-25.633	-30.633	-8.5	17.58372359	-0.38	N.A.	398.65	Angiosperm
Yang et al., 2015	Tibetan plateau	China	33.45	91.03	293.47	-25.678	-30.678	-8.5	17.63072167	-0.32	N.A.	398.65	Angiosperm
Yang et al., 2015	Tibetan plateau	China	33.45	91.03	427.23	-24.98	-29.98	-8.5	16.90221739	-0.3	N.A.	398.65	Angiosperm
Yang et al., 2015	Tibetan plateau	China	33.45	91.03	375.33	-26.578	-31.578	-8.5	18.57159588	-0.28	N.A.	398.65	Angiosperm
Yang et al., 2015	Tibetan plateau	China	33.45	91.03	277.54	-24.354	-29.354	-8.5	16.24974632	-0.22	N.A.	398.65	Angiosperm
Yang et al., 2015	Tibetan plateau	China	33.45	91.03	495.89	-25.52	-30.52	-8.5	17.46572531	-0.21	N.A.	398.65	Angiosperm
Yang et al., 2015	Tibetan plateau	China	33.45	91.03	448.81	-25.55	-30.55	-8.5	17.49704962	-0.2	N.A.	398.65	Angiosperm
Yang et al., 2015	Tibetan plateau	China	33.45	91.03	371.12	-22.609	-27.609	-8.5	14.43536926	-0.12	N.A.	398.65	Angiosperm
Yang et al., 2015	Tibetan plateau	China	33.45	91.03	456.21	-25.77	-30.77	-8.5	17.72682016	-0.11	N.A.	398.65	Angiosperm
Yang et al., 2015	Tibetan plateau	China	33.45	91.03	475.17	-25.43	-30.43	-8.5	17.37176396	-0.11	N.A.	398.65	Angiosperm
Yang et al., 2015	Tibetan plateau	China	33.45	91.03	441.71	-24.05	-29.05	-8.5	15.9331933	0.13	N.A.	398.65	Angiosperm
Yang et al., 2015	Tibetan plateau	China	33.45	91.03	573.56	-25.39	-30.39	-8.5	17.33000893	0.16	N.A.	398.65	Angiosperm

Yang et al., 2015	Tibetan plateau	China	33.45	91.03	477.36	-25.28	-30.28	-8.5	17.21520026	0.17	N.A.	398.65	Angiosperm
Yang et al., 2015	Tibetan plateau	China	33.45	91.03	417.84	-25.63	-30.63	-8.5	17.58059054	0.18	N.A.	398.65	Angiosperm
Yang et al., 2015	Tibetan plateau	China	33.45	91.03	335.46	-26.07	-31.07	-8.5	18.04031091	0.23	N.A.	398.65	Angiosperm
Yang et al., 2015	Tibetan plateau	China	33.45	91.03	323.8	-26.08	-31.08	-8.5	18.05076392	0.31	N.A.	398.65	Angiosperm
Yang et al., 2015	Tibetan plateau	China	33.45	91.03	331.68	-26.854	-31.854	-8.5	18.86047931	0.33	N.A.	398.65	Angiosperm
Yang et al., 2015	Tibetan plateau	China	33.45	91.03	322.52	-26.605	-31.605	-8.5	18.59984898	0.36	N.A.	398.65	Angiosperm
Yang et al., 2015	Tibetan plateau	China	33.45	91.03	358.8	-25.886	-30.886	-8.5	17.84801368	0.37	N.A.	398.65	Angiosperm
Yang et al., 2015	Tibetan plateau	China	33.45	91.03	437.5	-25.597	-30.597	-8.5	17.54612824	0.38	N.A.	398.65	Angiosperm
Yang et al., 2015	Tibetan plateau	China	33.45	91.03	265.79	-25.502	-30.502	-8.5	17.44693165	0.39	N.A.	398.65	Angiosperm
Yang et al., 2015	Tibetan plateau	China	33.45	91.03	404.91	-23.619	-28.619	-8.5	15.48473393	0.39	N.A.	398.65	Angiosperm
Yang et al., 2015	Tibetan plateau	China	33.45	91.03	267.64	-25.7	-30.7	-8.5	17.65370009	0.52	N.A.	398.65	Angiosperm
Yang et al., 2015	Tibetan plateau	China	33.45	91.03	245.88	-25.331	-30.331	-8.5	17.26842651	0.59	N.A.	398.65	Angiosperm
Yang et al., 2015	Tibetan plateau	China	33.45	91.03	642.31	-24.85	-29.85	-8.5	16.76665128	0.6	N.A.	398.65	Angiosperm
Yang et al., 2015	Tibetan plateau	China	33.45	91.03	642.31	-25.01	-30.01	-8.5	16.93350701	0.6	N.A.	398.65	Angiosperm
Yang et al., 2015	Tibetan plateau	China	33.45	91.03	642.31	-25.09	-30.09	-8.5	17.01695541	0.6	N.A.	398.65	Angiosperm
Yang et al., 2015	Tibetan plateau	China	33.45	91.03	642.31	-25.19	-30.19	-8.5	17.12128517	0.6	N.A.	398.65	Angiosperm
Yang et al., 2015	Tibetan plateau	China	33.45	91.03	254.14	-25.279	-30.279	-8.5	17.21415667	0.64	N.A.	398.65	Angiosperm
Yang et al., 2015	Tibetan plateau	China	33.45	91.03	307.39	-26.463	-31.463	-8.5	18.45127612	0.64	N.A.	398.65	Angiosperm
Yang et al., 2015	Tibetan plateau	China	33.45	91.03	318.22	-25.37	-30.37	-8.5	17.3091327	0.64	N.A.	398.65	Angiosperm
Yang et al., 2015	Tibetan plateau	China	33.45	91.03	228.65	-25.53	-30.53	-8.5	17.47616653	0.67	N.A.	398.65	Angiosperm

Yang et al., 2015	Tibetan plateau	China	33.45	91.03	367.21	-26.424	-31.424	-8.5	18.41047848	0.67	N.A.	398.65	Angiosperm
Yang et al., 2015	Tibetan plateau	China	33.45	91.03	650.53	-24.66	-29.66	-8.5	16.56858121	0.69	N.A.	398.65	Angiosperm
Yang et al., 2015	Tibetan plateau	China	33.45	91.03	650.53	-25.05	-30.05	-8.5	16.9752295	0.69	N.A.	398.65	Angiosperm
Yang et al., 2015	Tibetan plateau	China	33.45	91.03	650.53	-25.53	-30.53	-8.5	17.47616653	0.69	N.A.	398.65	Angiosperm
Yang et al., 2015	Tibetan plateau	China	33.45	91.03	289.52	-25.673	-30.673	-8.5	17.62549945	0.7	N.A.	398.65	Angiosperm
Yang et al., 2015	Tibetan plateau	China	33.45	91.03	659.21	-25.08	-30.08	-8.5	17.00652361	0.75	N.A.	398.65	Angiosperm
Yang et al., 2015	Tibetan plateau	China	33.45	91.03	349.63	-26.338	-31.338	-8.5	18.32052601	0.83	N.A.	398.65	Angiosperm
Yang et al., 2015	Tibetan plateau	China	33.45	91.03	351.23	-26.27	-31.27	-8.5	18.24941205	0.83	N.A.	398.65	Angiosperm
Yang et al., 2015	Tibetan plateau	China	33.45	91.03	371.57	-24.619	-29.619	-8.5	16.5258499	0.84	N.A.	398.65	Angiosperm
Yang et al., 2015	Tibetan plateau	China	33.45	91.03	380.18	-25.95	-30.95	-8.5	17.91489143	0.87	N.A.	398.65	Angiosperm
Yang et al., 2015	Tibetan plateau	China	33.45	91.03	350.86	-26.02	-31.02	-8.5	17.98804904	0.89	N.A.	398.65	Angiosperm
Yang et al., 2015	Tibetan plateau	China	33.45	91.03	329.06	-26.344	-31.344	-8.5	18.32680125	1.08	N.A.	398.65	Angiosperm
Yang et al., 2015	Tibetan plateau	China	33.45	91.03	415.55	-23.22	-28.22	-8.5	15.06992363	1.1	N.A.	398.65	Angiosperm
Yang et al., 2015	Tibetan plateau	China	33.45	91.03	434.91	-26.121	-31.121	-8.5	18.09362354	1.13	N.A.	398.65	Angiosperm
Yang et al., 2015	Tibetan plateau	China	33.45	91.03	426.38	-23.914	-28.914	-8.5	15.79164131	1.16	N.A.	398.65	Angiosperm
Yang et al., 2015	Tibetan plateau	China	33.45	91.03	472.94	-25.26	-30.26	-8.5	17.19432874	1.18	N.A.	398.65	Angiosperm
Yang et al., 2015	Tibetan plateau	China	33.45	91.03	423.24	-24.843	-29.843	-8.5	16.7593526	1.2	N.A.	398.65	Angiosperm
Yang et al., 2015	Tibetan plateau	China	33.45	91.03	526.79	-25.86	-30.86	-8.5	17.82084711	1.22	N.A.	398.65	Angiosperm
Yang et al., 2015	Tibetan plateau	China	33.45	91.03	488.76	-23.85	-28.85	-8.5	15.72504226	1.23	N.A.	398.65	Angiosperm
Yang et al., 2015	Tibetan plateau	China	33.45	91.03	456.29	-26.3	-31.3	-8.5	18.28078464	1.24	N.A.	398.65	Angiosperm

Yang et al., 2015	Tibetan plateau	China	33.45	91.03	521.26	-25.283	-30.283	-8.5	17.21833106	1.27	N.A.	398.65	Angiosperm
Yang et al., 2015	Tibetan plateau	China	33.45	91.03	524.91	-26.29	-31.29	-8.5	18.27032689	1.29	N.A.	398.65	Angiosperm
Yang et al., 2015	Tibetan plateau	China	33.45	91.03	219.39	-25.011	-30.011	-8.5	16.93455003	1.31	N.A.	398.65	Angiosperm
Yang et al., 2015	Tibetan plateau	China	33.45	91.03	214.98	-24.745	-29.745	-8.5	16.65718197	1.32	N.A.	398.65	Angiosperm
Yang et al., 2015	Tibetan plateau	China	33.45	91.03	551.06	-26.33	-31.33	-8.5	18.31215915	1.33	N.A.	398.65	Angiosperm
Yang et al., 2015	Tibetan plateau	China	33.45	91.03	693.67	-24.54	-29.54	-8.5	16.44352408	1.37	N.A.	398.65	Angiosperm
Yang et al., 2015	Tibetan plateau	China	33.45	91.03	227.88	-25.05	-30.05	-8.5	16.9752295	1.38	N.A.	398.65	Angiosperm
Yang et al., 2015	Tibetan plateau	China	33.45	91.03	230.44	-25.357	-30.357	-8.5	17.29556361	1.42	N.A.	398.65	Angiosperm
Yang et al., 2015	Tibetan plateau	China	33.45	91.03	547.98	-25.71	-30.71	-8.5	17.66414517	1.42	N.A.	398.65	Angiosperm
Yang et al., 2015	Tibetan plateau	China	33.45	91.03	548.68	-25.16	-30.16	-8.5	17.089984	1.52	N.A.	398.65	Angiosperm

Table 2

Quaternary Compilation

References	Age (Ma)	Location	Country	Latitude	Longitude	Substrate	Sample	Taxon	Grazers/Browsers	$\delta^{13}C_{plant}$ (‰, VPDB)	Long-chain n-alkane	$\delta^{13}C_{air}$ (‰, VPDB)	$\Delta^{13}C$ (‰, VPDB)	pCO_2
Bocherens et al., 2015b	0.011	Denmark	Europe	56.2639	9.5018	Collagen	-22.6	Alces alces	Browsers	-27.6	-32.6	-6.80364	21.38663102	294.6
Bocherens et al., 2015b	0.011	Denmark	Europe	56.2639	9.5018	Collagen	-22.2	Alces alces	Browsers	-27.2	-32.2	-6.80364	20.96665296	294.6
Bocherens et al., 2015b	0.011	Denmark	Europe	56.2639	9.5018	Collagen	-21.9	Alces alces	Browsers	-26.9	-31.9	-6.80364	20.651896	294.6
Bocherens et al., 2015b	0.011	Denmark	Europe	56.2639	9.5018	Collagen	-21.8	Bos primigenius	Grazers	-26.8	-31.8	-6.80364	20.54702014	294.6
Bocherens et al., 2015b	0.011	Denmark	Europe	56.2639	9.5018	Collagen	-21.7	Bos primigenius	Grazers	-26.7	-31.7	-6.80364	20.44216583	294.6
Bocherens et al., 2015b	0.011	Denmark	Europe	56.2639	9.5018	Collagen	-21.7	Rangifer tarandus	Grazers	-26.7	-31.7	-6.80364	20.44216583	294.6
Bocherens et al., 2015b	0.011	Denmark	Europe	56.2639	9.5018	Collagen	-21.6	Alces alces	Browsers	-26.6	-31.6	-6.80364	20.33733306	294.6
Bocherens et	0.011	Denmark	Europe	56.2639	9.5018	Collagen	-21.3	Alces alces	Browsers	-26.3	-31.3	-6.80364	20.02296395	294.6

al., 2015b														
Bocherens et al., 2015b	0.011	Denmark	Europe	56.2639	9.5018	Collagen	-21.3	Rangifer tarandus	Grazers	-26.3	-31.3	-6.80364	20.02296395	294.6
Bocherens et al., 2015b	0.011	Denmark	Europe	56.2639	9.5018	Collagen	-21.1	Bos primigenius	Grazers	-26.1	-31.1	-6.80364	19.81349214	294.6
Bocherens et al., 2015b	0.011	Denmark	Europe	56.2639	9.5018	Collagen	-21	Alces alces	Browsers	-26	-31	-6.80364	19.7087885	294.6
Bocherens et al., 2015b	0.011	Denmark	Europe	56.2639	9.5018	Collagen	-20.9	Bos primigenius	Grazers	-25.9	-30.9	-6.80364	19.60410635	294.6
Bocherens et al., 2015b	0.011	Denmark	Europe	56.2639	9.5018	Collagen	-20.7	Bos primigenius	Grazers	-25.7	-30.7	-6.80364	19.39480653	294.6
Bocherens et al., 2015b	0.011	Denmark	Europe	56.2639	9.5018	Collagen	-20.3	Rangifer tarandus	Grazers	-25.3	-30.3	-6.80364	18.97646455	294.6
Bocherens et al., 2015b	0.011	Denmark	Europe	56.2639	9.5018	Collagen	-20.1	Alces alces	Browsers	-25.1	-30.1	-6.80364	18.7674223	294.6
Bocherens et al., 2015b	0.011	Denmark	Europe	56.2639	9.5018	Collagen	-19.9	Rangifer tarandus	Grazers	-24.9	-29.9	-6.80364	18.5584658	294.6
Bocherens et al., 2015b	0.011	Denmark	Europe	56.2639	9.5018	Collagen	-19.7	Rangifer tarandus	Grazers	-24.7	-29.7	-6.80364	18.349595	294.6
Bocherens et	0.011	Denmark	Europe	56.2639	9.5018	Collagen	-19.5	Rangifer tarandus	Grazers	-24.5	-29.5	-6.80364	18.14080984	294.6

al., 2015b														
Bocherens et al., 2015b	0.011	Denmark	Europe	56.2639	9.5018	Collagen	-19.3	Rangifer tarandus	Grazers	-24.3	-29.3	-6.80364	17.93211028	294.6
Bocherens et al., 2015b	0.011	Denmark	Europe	56.2639	9.5018	Collagen	-19.2	Rangifer tarandus	Grazers	-24.2	-29.2	-6.80364	17.82779258	294.6
Bocherens et al., 2015b	0.011	Denmark	Europe	56.2639	9.5018	Collagen	-19.2	Rangifer tarandus	Grazers	-24.2	-29.2	-6.80364	17.82779258	294.6
Bocherens et al., 2015b	0.011	Denmark	Europe	56.2639	9.5018	Collagen	-19	Bos primigenius	Grazers	-24	-29	-6.80364	17.61922131	294.6
Bocherens et al., 2015b	0.011	Denmark	Europe	56.2639	9.5018	Collagen	-18.8	Rangifer tarandus	Grazers	-23.8	-28.8	-6.80364	17.41073551	294.6
Bocherens et al., 2015b	0.011	Denmark	Europe	56.2639	9.5018	Collagen	-18.7	Rangifer tarandus	Grazers	-23.7	-28.7	-6.80364	17.30652463	294.6
Bocherens et al., 2015b	0.011	Denmark	Europe	56.2639	9.5018	Collagen	-18.6	Rangifer tarandus	Grazers	-23.6	-28.6	-6.80364	17.20233511	294.6
Bocherens et al., 2015b	0.011	Denmark	Europe	56.2639	9.5018	Collagen	-18.4	Rangifer tarandus	Grazers	-23.4	-28.4	-6.80364	16.99402007	294.6
Bocherens et al., 2015b	0.011	Denmark	Europe	56.2639	9.5018	Collagen	-18.2	Rangifer tarandus	Grazers	-23.2	-28.2	-6.80364	16.78579034	294.6
Bocherens et	0.011	Denmark	Europe	56.2639	9.5018	Collagen	-18	Rangifer tarandus	Grazers	-23	-28	-6.80364	16.57764585	294.6

al., 2015b														
Bocherens et al., 2015b	0.011	Denmark	Europe	56.2639	9.5018	Collagen	-17.8	Rangifer tarandus	Grazers	-22.8	-27.8	-6.80364	16.36958657	294.6
Gilmour et al., 2011	0.014	Oregon	USA	44.9426	122.9338	Collagen	-21.8	Equus sp.	Grazers	-26.8	-31.8	-6.78727	20.56384094	302.4
Gilmour et al., 2011	0.014	Oregon	USA	44.9426	122.9338	Collagen	-21.7	Equus sp.	Grazers	-26.7	-31.7	-6.78727	20.4589849	302.4
Gilmour et al., 2011	0.014	Oregon	USA	44.9426	122.9338	Collagen	-21.6	Mammuthus sp.	Grazers	-26.6	-31.6	-6.78727	20.3541504	302.4
Gilmour et al., 2011	0.014	Oregon	USA	44.9426	122.9338	Collagen	-21.3	Mammuthus columbi	Grazers	-26.3	-31.3	-6.78727	20.03977611	302.4
Gilmour et al., 2011	0.014	Oregon	USA	44.9426	122.9338	Collagen	-21	Bison antiquus	Grazers	-26	-31	-6.78727	19.72559548	302.4
Gilmour et al., 2011	0.014	Oregon	USA	44.9426	122.9338	Collagen	-21	Paramylodon harlani	N.A.	-26	-31	-6.78727	19.72559548	302.4
Gilmour et al., 2011	0.014	Oregon	USA	44.9426	122.9338	Collagen	-20.9	Bison sp.	Grazers	-25.9	-30.9	-6.78727	19.62091161	302.4
Gilmour et al., 2011	0.014	Oregon	USA	44.9426	122.9338	Collagen	-20.8	Bison sp.	Grazers	-25.8	-30.8	-6.78727	19.51624923	302.4
Gilmour et al., 2011	0.014	Oregon	USA	44.9426	122.9338	Collagen	-20.8	Paramylodon harlani	N.A.	-25.8	-30.8	-6.78727	19.51624923	302.4
Gilmour et al., 2011	0.014	Oregon	USA	44.9426	122.9338	Collagen	-20.7	Bison sp.	Grazers	-25.7	-30.7	-6.78727	19.41160833	302.4
Gilmour et al., 2011	0.014	Oregon	USA	44.9426	122.9338	Collagen	-20.5	Bison antiquus	Grazers	-25.5	-30.5	-6.78727	19.20239097	302.4
Gilmou	0.014	Oregon	USA	44.942	122.933	Collag	-20.1	Mammut	Both	-25.1	-	-6.78727	18.7842	302.4

r et al., 2011				6	8	en		americamum			30.1		1377	
France et al., 2007	0.016	Virginia	USA	36.8815	81.7621	Collagen	-22.71	Horse	Grazers	-27.71	-32.71	-6.77636	21.53024303	307.6
France et al., 2007	0.016	Virginia	USA	36.8815	81.7621	Collagen	-22.4	Mastodon	Both	-27.4	-32.4	-6.77636	21.20464734	307.6
France et al., 2007	0.016	Virginia	USA	36.8815	81.7621	Collagen	-22.08	Mastodon	Both	-27.08	-32.08	-6.77636	20.86876619	307.6
France et al., 2007	0.016	Virginia	USA	36.8815	81.7621	Collagen	-22	Mammoth	Grazers	-27	-32	-6.77636	20.78483042	307.6
France et al., 2007	0.016	Virginia	USA	36.8815	81.7621	Collagen	-21.79	Ovibovine	Grazers	-26.79	-31.79	-6.77636	20.56456469	307.6
France et al., 2007	0.016	Virginia	USA	36.8815	81.7621	Collagen	-21.35	Mammoth	Grazers	-26.35	-31.35	-6.77636	20.10336363	307.6
France et al., 2007	0.016	Virginia	USA	36.8815	81.7621	Collagen	-21.15	Mastodon	Both	-26.15	-31.15	-6.77636	19.89386456	307.6
France et al., 2007	0.016	Virginia	USA	36.8815	81.7621	Collagen	-21.11	Deer	Browsers	-26.11	-31.11	-6.77636	19.85197507	307.6
France et al., 2007	0.016	Virginia	USA	36.8815	81.7621	Collagen	-20.95	Musk ox	Grazers	-25.95	-30.95	-6.77636	19.68445152	307.6
France et al., 2007	0.016	Virginia	USA	36.8815	81.7621	Collagen	-20.94	Musk ox	Grazers	-25.94	-30.94	-6.77636	19.67398312	307.6
France et al., 2007	0.016	Virginia	USA	36.8815	81.7621	Collagen	-20.9	Musk ox	Grazers	-25.9	-30.9	-6.77636	19.63211169	307.6
France et al., 2007	0.016	Virginia	USA	36.8815	81.7621	Collagen	-20.81	Musk ox	Grazers	-25.81	-30.81	-6.77636	19.53791355	307.6
France et al.,	0.016	Virginia	USA	36.8815	81.7621	Collagen	-20.7	Musk ox	Grazers	-25.71	-30.7	-6.77636	19.43326936	307.6

2007							1				1			
France et al., 2007	0.016	Virginia	USA	36.8815	81.7621	Collagen	-20.67	Musk ox	Grazers	-25.67	-30.67	-6.77636	19.39141769	307.6
France et al., 2007	0.016	Virginia	USA	36.8815	81.7621	Collagen	-20.66	Megalonyx	Grazers	-25.66	-30.66	-6.77636	19.38095531	307.6
France et al., 2007	0.016	Virginia	USA	36.8815	81.7621	Collagen	-20.64	Musk ox	Grazers	-25.64	-30.64	-6.77636	19.3600312	307.6
France et al., 2007	0.016	Virginia	USA	36.8815	81.7621	Collagen	-20.61	Musk ox	Grazers	-25.61	-30.61	-6.77636	19.32864664	307.6
France et al., 2007	0.016	Virginia	USA	36.8815	81.7621	Collagen	-20.59	Mammoth	Grazers	-25.59	-30.59	-6.77636	19.30772467	307.6
France et al., 2007	0.016	Virginia	USA	36.8815	81.7621	Collagen	-20.55	Musk ox	Grazers	-25.55	-30.55	-6.77636	19.26588332	307.6
France et al., 2007	0.016	Virginia	USA	36.8815	81.7621	Collagen	-20.48	Musk ox	Grazers	-25.48	-30.48	-6.77636	19.19266921	307.6
France et al., 2007	0.016	Virginia	USA	36.8815	81.7621	Collagen	-20.4	Musk ox	Grazers	-25.4	-30.4	-6.77636	19.10900882	307.6
France et al., 2007	0.016	Virginia	USA	36.8815	81.7621	Collagen	-20.36	Musk ox	Grazers	-25.36	-30.36	-6.77636	19.06718378	307.6
France et al., 2007	0.016	Virginia	USA	36.8815	81.7621	Collagen	-20.28	Caribou	Browsers	-25.28	-30.28	-6.77636	18.98354399	307.6
France et al., 2007	0.016	Virginia	USA	36.8815	81.7621	Collagen	-20.28	Deer	Browsers	-25.28	-30.28	-6.77636	18.98354399	307.6
France et al., 2007	0.016	Virginia	USA	36.8815	81.7621	Collagen	-19.99	Musk ox	Grazers	-24.99	-29.99	-6.77636	18.68046482	307.6
France et al., 2007	0.016	Virginia	USA	36.8815	81.7621	Collagen	-19.91	Musk ox	Grazers	-24.91	-29.91	-6.77636	18.59688849	307.6

Bocherens et al., 2003	0.02	Palaeolithic sites	France	45.0539	1.1677	Collagen	-21.1	Horse	Grazers	-26.1	-31.1	-6.75455	19.86389773	318
Bocherens et al., 2003	0.02	Palaeolithic sites	France	45.0539	1.1677	Collagen	-21	Horse	Grazers	-26	-31	-6.75455	19.75918891	318
Bocherens et al., 2003	0.02	Palaeolithic sites	France	45.0539	1.1677	Collagen	-20.9	Squirrel	Browsers	-25.9	-30.9	-6.75455	19.65450159	318
Bocherens et al., 2003	0.02	Palaeolithic sites	France	45.0539	1.1677	Collagen	-20.2	Hare	Browsers	-25.2	-30.2	-6.75455	18.92229175	318
Bocherens et al., 2003	0.02	Palaeolithic sites	France	45.0539	1.1677	Collagen	-20.1	Bos/Bison	Grazers	-25.1	-30.1	-6.75455	18.81777618	318
Bocherens et al., 2003	0.02	Palaeolithic sites	France	45.0539	1.1677	Collagen	-19.9	Bos/Bison	Grazers	-24.9	-29.9	-6.75455	18.60880935	318
Bocherens et al., 2003	0.02	Palaeolithic sites	France	45.0539	1.1677	Collagen	-19.8	Snowy owl	Browsers	-24.8	-29.8	-6.75455	18.50435808	318
Bocherens et al., 2003	0.02	Palaeolithic sites	France	45.0539	1.1677	Collagen	-19.6	Reindeer	Browsers	-24.6	-29.6	-6.75455	18.29551979	318
Bocherens et al., 2003	0.02	Palaeolithic sites	France	45.0539	1.1677	Collagen	-19.6	Saiga	Grazers	-24.6	-29.6	-6.75455	18.29551979	318
Bocherens et al., 2003	0.02	Palaeolithic sites	France	45.0539	1.1677	Collagen	-19.3	Red Deer	Browsers	-24.3	-29.3	-6.75455	17.98242288	318

Bocherens et al., 2003	0.02	Palaeolithic sites	France	45.0539	1.1677	Collagen	-19.1	Reindeer	Browsers	-24.1	-29.1	-6.75455	17.77379854	318
Bocherens et al., 2003	0.02	Palaeolithic sites	France	45.0539	1.1677	Collagen	-19	Wolf	Both	-24	-29	-6.75455	17.66951844	318
Coltrain et al., 2004	0.02	California	USA	34.05	118.2426	Collagen	-22.02	E. occidentalis	N.A.	-27.02	-32.02	-6.75455	20.82822874	318
Coltrain et al., 2004	0.02	California	USA	34.05	118.2426	Collagen	-21.71	E. occidentalis	N.A.	-26.71	-31.71	-6.75455	20.50308747	318
Coltrain et al., 2004	0.02	California	USA	34.05	118.2426	Collagen	-21.7	E. occidentalis	N.A.	-26.7	-31.7	-6.75455	20.49260249	318
Coltrain et al., 2004	0.02	California	USA	34.05	118.2426	Collagen	-21.61	E. occidentalis	N.A.	-26.61	-31.61	-6.75455	20.39824736	318
Coltrain et al., 2004	0.02	California	USA	34.05	118.2426	Collagen	-21.6	E. occidentalis	N.A.	-26.6	-31.6	-6.75455	20.38776454	318
Coltrain et al., 2004	0.02	California	USA	34.05	118.2426	Collagen	-21.56	E. occidentalis	N.A.	-26.56	-31.56	-6.75455	20.34583539	318
Coltrain et al., 2004	0.02	California	USA	34.05	118.2426	Collagen	-21.49	P. harlani	N.A.	-26.49	-31.49	-6.75455	20.27246767	318
Coltrain et al., 2004	0.02	California	USA	34.05	118.2426	Collagen	-21.48	P. harlani	N.A.	-26.48	-31.48	-6.75455	20.26198743	318
Coltrain et al., 2004	0.02	California	USA	34.05	118.2426	Collagen	-21.41	P. harlani	N.A.	-26.41	-31.41	-6.75455	20.18863176	318
Coltrain et al., 2004	0.02	California	USA	34.05	118.2426	Collagen	-21.36	P. harlani	N.A.	-26.36	-31.36	-6.75455	20.13624132	318
Coltrain et al.,	0.02	California	USA	34.05	118.2426	Collagen	-21.3	E. occidentalis	N.A.	-26.35	-31.3	-6.75455	20.12576388	318

2004							5				5			
Coltrain et al., 2004	0.02	California	USA	34.05	118.2426	Collagen	-21.27	P. harlani	N.A.	-26.27	-31.27	-6.75455	20.04195208	318
Coltrain et al., 2004	0.02	California	USA	34.05	118.2426	Collagen	-21.23	E. occidentalis	N.A.	-26.23	-31.23	-6.75455	20.00005135	318
Coltrain et al., 2004	0.02	California	USA	34.05	118.2426	Collagen	-21.22	E. occidentalis	N.A.	-26.22	-31.22	-6.75455	19.9895767	318
Coltrain et al., 2004	0.02	California	USA	34.05	118.2426	Collagen	-21.19	E. occidentalis	N.A.	-26.19	-31.19	-6.75455	19.95815405	318
Coltrain et al., 2004	0.02	California	USA	34.05	118.2426	Collagen	-21.18	E. occidentalis	N.A.	-26.18	-31.18	-6.75455	19.94768027	318
Coltrain et al., 2004	0.02	California	USA	34.05	118.2426	Collagen	-21.17	B. antiquus	Grazers	-26.17	-31.17	-6.75455	19.9372067	318
Coltrain et al., 2004	0.02	California	USA	34.05	118.2426	Collagen	-21.16	E. occidentalis	N.A.	-26.16	-31.16	-6.75455	19.92673334	318
Coltrain et al., 2004	0.02	California	USA	34.05	118.2426	Collagen	-21.16	E. occidentalis	N.A.	-26.16	-31.16	-6.75455	19.92673334	318
Coltrain et al., 2004	0.02	California	USA	34.05	118.2426	Collagen	-21.16	P. harlani	N.A.	-26.16	-31.16	-6.75455	19.92673334	318
Coltrain et al., 2004	0.02	California	USA	34.05	118.2426	Collagen	-21.14	E. occidentalis	N.A.	-26.14	-31.14	-6.75455	19.90578728	318
Coltrain et al., 2004	0.02	California	USA	34.05	118.2426	Collagen	-21.03	E. occidentalis	N.A.	-26.03	-31.03	-6.75455	19.7905993	318
Coltrain et al., 2004	0.02	California	USA	34.05	118.2426	Collagen	-21	C. hesternus	Grazers	-26	-31	-6.75455	19.75918891	318
Coltrain et al., 2004	0.02	California	USA	34.05	118.2426	Collagen	-20.98	E. occidentalis	N.A.	-25.98	-30.98	-6.75455	19.73824973	318

Coltrain et al., 2004	0.02	California	USA	34.05	118.2426	Collagen	-20.93	B. antiquus	Grazers	-25.93	-30.93	-6.75455	19.68590553	318
Coltrain et al., 2004	0.02	California	USA	34.05	118.2426	Collagen	-20.81	C. latrans	Grazers	-25.81	-30.81	-6.75455	19.56030138	318
Coltrain et al., 2004	0.02	California	USA	34.05	118.2426	Collagen	-20.8	B. antiquus	Grazers	-25.8	-30.8	-6.75455	19.54983576	318
Coltrain et al., 2004	0.02	California	USA	34.05	118.2426	Collagen	-20.79	C. hesternus	Grazers	-25.79	-30.79	-6.75455	19.53937036	318
Coltrain et al., 2004	0.02	California	USA	34.05	118.2426	Collagen	-20.79	E. occidentalis	N.A.	-25.79	-30.79	-6.75455	19.53937036	318
Coltrain et al., 2004	0.02	California	USA	34.05	118.2426	Collagen	-20.78	M. americanum	Both	-25.78	-30.78	-6.75455	19.52890518	318
Coltrain et al., 2004	0.02	California	USA	34.05	118.2426	Collagen	-20.76	E. occidentalis	N.A.	-25.76	-30.76	-6.75455	19.50797545	318
Coltrain et al., 2004	0.02	California	USA	34.05	118.2426	Collagen	-20.72	B. antiquus	Grazers	-25.72	-30.72	-6.75455	19.46611857	318
Coltrain et al., 2004	0.02	California	USA	34.05	118.2426	Collagen	-20.72	C. hesternus	Grazers	-25.72	-30.72	-6.75455	19.46611857	318
Coltrain et al., 2004	0.02	California	USA	34.05	118.2426	Collagen	-20.72	E. occidentalis	N.A.	-25.72	-30.72	-6.75455	19.46611857	318
Coltrain et al., 2004	0.02	California	USA	34.05	118.2426	Collagen	-20.72	M. americanum	Both	-25.72	-30.72	-6.75455	19.46611857	318
Coltrain et al., 2004	0.02	California	USA	34.05	118.2426	Collagen	-20.7	C. latrans	Grazers	-25.7	-30.7	-6.75455	19.44519142	318
Coltrain et al., 2004	0.02	California	USA	34.05	118.2426	Collagen	-20.7	P. harlani	N.A.	-25.7	-30.7	-6.75455	19.44519142	318
Coltrain	0.02	California	USA	34.05	118.242	Collag	-	P. harlani	N.A.	-	-	-6.75455	19.4033	318

et al., 2004					6	en	20.66			25.66	30.66		397	
Coltrain et al., 2004	0.02	California	USA	34.05	118.2426	Collagen	-20.63	B. antiquus	Grazers	-25.63	-30.63	-6.75455	19.37195316	318
Coltrain et al., 2004	0.02	California	USA	34.05	118.2426	Collagen	-20.63	C. hesternus	Grazers	-25.63	-30.63	-6.75455	19.37195316	318
Coltrain et al., 2004	0.02	California	USA	34.05	118.2426	Collagen	-20.63	C. hesternus	Grazers	-25.63	-30.63	-6.75455	19.37195316	318
Coltrain et al., 2004	0.02	California	USA	34.05	118.2426	Collagen	-20.6	B. antiquus	Grazers	-25.6	-30.6	-6.75455	19.34056856	318
Coltrain et al., 2004	0.02	California	USA	34.05	118.2426	Collagen	-20.53	M. americanum	Both	-25.53	-30.53	-6.75455	19.26734533	318
Coltrain et al., 2004	0.02	California	USA	34.05	118.2426	Collagen	-20.52	C. minor	N.A.	-25.52	-30.52	-6.75455	19.25688572	318
Coltrain et al., 2004	0.02	California	USA	34.05	118.2426	Collagen	-20.46	C. hesternus	Grazers	-25.46	-30.46	-6.75455	19.19413262	318
Coltrain et al., 2004	0.02	California	USA	34.05	118.2426	Collagen	-20.46	C. hesternus	Grazers	-25.46	-30.46	-6.75455	19.19413262	318
Coltrain et al., 2004	0.02	California	USA	34.05	118.2426	Collagen	-20.46	M. americanum	Both	-25.46	-30.46	-6.75455	19.19413262	318
Coltrain et al., 2004	0.02	California	USA	34.05	118.2426	Collagen	-20.42	B. antiquus	Grazers	-25.42	-30.42	-6.75455	19.1523015	318
Coltrain et al., 2004	0.02	California	USA	34.05	118.2426	Collagen	-20.41	C. hesternus	Grazers	-25.41	-30.41	-6.75455	19.14184426	318
Coltrain et al., 2004	0.02	California	USA	34.05	118.2426	Collagen	-20.4	C. hesternus	Grazers	-25.4	-30.4	-6.75455	19.13138724	318
Coltrain et al.,	0.02	California	USA	34.05	118.2426	Collagen	-20.3	C. hesternus	Grazers	-25.39	-30.3	-6.75455	19.12093042	318

2004							9				9			
Coltrain et al., 2004	0.02	California	USA	34.05	118.2426	Collagen	-20.38	B. antiquus	Grazers	-25.38	-30.38	-6.75455	19.11047383	318
Coltrain et al., 2004	0.02	California	USA	34.05	118.2426	Collagen	-20.38	P. harlani	N.A.	-25.38	-30.38	-6.75455	19.11047383	318
Coltrain et al., 2004	0.02	California	USA	34.05	118.2426	Collagen	-20.35	B. antiquus	Grazers	-25.35	-30.35	-6.75455	19.07910532	318
Coltrain et al., 2004	0.02	California	USA	34.05	118.2426	Collagen	-20.31	C. latrans	Grazers	-25.31	-30.31	-6.75455	19.03728365	318
Coltrain et al., 2004	0.02	California	USA	34.05	118.2426	Collagen	-20.26	C. hesternus	Grazers	-25.26	-30.26	-6.75455	18.98501139	318
Coltrain et al., 2004	0.02	California	USA	34.05	118.2426	Collagen	-20.11	P. leo atrox	Both	-25.11	-30.11	-6.75455	18.82822677	318
Coltrain et al., 2004	0.02	California	USA	34.05	118.2426	Collagen	-20.1	C. latrans	Grazers	-25.1	-30.1	-6.75455	18.81777618	318
Coltrain et al., 2004	0.02	California	USA	34.05	118.2426	Collagen	-20.08	C. latrans	Grazers	-25.08	-30.08	-6.75455	18.79687564	318
Coltrain et al., 2004	0.02	California	USA	34.05	118.2426	Collagen	-20.04	B. antiquus	Grazers	-25.04	-30.04	-6.75455	18.75507713	318
Coltrain et al., 2004	0.02	California	USA	34.05	118.2426	Collagen	-20.02	M. americanum	Both	-25.02	-30.02	-6.75455	18.73417916	318
Coltrain et al., 2004	0.02	California	USA	34.05	118.2426	Collagen	-19.99	B. antiquus	Grazers	-24.99	-29.99	-6.75455	18.70283382	318
Coltrain et al., 2004	0.02	California	USA	34.05	118.2426	Collagen	-19.99	P. harlani	N.A.	-24.99	-29.99	-6.75455	18.70283382	318
Coltrain et al., 2004	0.02	California	USA	34.05	118.2426	Collagen	-19.98	M. americanum	Both	-24.98	-29.98	-6.75455	18.6923858	318

Coltrain et al., 2004	0.02	California	USA	34.05	118.2426	Collagen	-19.95	C. dirus	Both	-24.95	-29.95	-6.75455	18.66104302	318
Coltrain et al., 2004	0.02	California	USA	34.05	118.2426	Collagen	-19.91	B. antiquus	Grazers	-24.91	-29.91	-6.75455	18.61925566	318
Coltrain et al., 2004	0.02	California	USA	34.05	118.2426	Collagen	-19.88	C. latrans	Grazers	-24.88	-29.88	-6.75455	18.58791738	318
Coltrain et al., 2004	0.02	California	USA	34.05	118.2426	Collagen	-19.87	M. americanum	Both	-24.87	-29.87	-6.75455	18.57747172	318
Coltrain et al., 2004	0.02	California	USA	34.05	118.2426	Collagen	-19.8	B. antiquus	Grazers	-24.8	-29.8	-6.75455	18.50435808	318
Coltrain et al., 2004	0.02	California	USA	34.05	118.2426	Collagen	-19.79	B. antiquus	Grazers	-24.79	-29.79	-6.75455	18.49391413	318
Coltrain et al., 2004	0.02	California	USA	34.05	118.2426	Collagen	-19.7	S. fatalis	Both	-24.7	-29.7	-6.75455	18.39992823	318
Coltrain et al., 2004	0.02	California	USA	34.05	118.2426	Collagen	-19.67	C. dirus	Both	-24.67	-29.67	-6.75455	18.36860345	318
Coltrain et al., 2004	0.02	California	USA	34.05	118.2426	Collagen	-19.67	C. dirus	Both	-24.67	-29.67	-6.75455	18.36860345	318
Coltrain et al., 2004	0.02	California	USA	34.05	118.2426	Collagen	-19.67	S. fatalis	Both	-24.67	-29.67	-6.75455	18.36860345	318
Coltrain et al., 2004	0.02	California	USA	34.05	118.2426	Collagen	-19.62	C. hesternus	Grazers	-24.62	-29.62	-6.75455	18.31639976	318
Coltrain et al., 2004	0.02	California	USA	34.05	118.2426	Collagen	-19.58	C. dirus	Both	-24.58	-29.58	-6.75455	18.27464067	318
Coltrain et al., 2004	0.02	California	USA	34.05	118.2426	Collagen	-19.58	C. latrans	Grazers	-24.58	-29.58	-6.75455	18.27464067	318
Coltrain	0.02	California	USA	34.05	118.242	Collag	-	C. dirus	Both	-	-	-6.75455	18.1806	318

et al., 2004					6	en	19.49			24.49	29.49		9523	
Coltrain et al., 2004	0.02	California	USA	34.05	118.2426	Collagen	-19.48	S. fatalis	Both	-24.48	-29.48	-6.75455	18.17025791	318
Coltrain et al., 2004	0.02	California	USA	34.05	118.2426	Collagen	-19.43	B. antiquus	Grazers	-24.43	-29.43	-6.75455	18.11807456	318
Coltrain et al., 2004	0.02	California	USA	34.05	118.2426	Collagen	-19.43	C. dirus	Both	-24.43	-29.43	-6.75455	18.11807456	318
Coltrain et al., 2004	0.02	California	USA	34.05	118.2426	Collagen	-19.4	B. antiquus	Grazers	-24.4	-29.4	-6.75455	18.08676712	318
Coltrain et al., 2004	0.02	California	USA	34.05	118.2426	Collagen	-19.4	S. fatalis	Both	-24.4	-29.4	-6.75455	18.08676712	318
Coltrain et al., 2004	0.02	California	USA	34.05	118.2426	Collagen	-19.31	C. dirus	Both	-24.31	-29.31	-6.75455	17.99285634	318
Coltrain et al., 2004	0.02	California	USA	34.05	118.2426	Collagen	-19.3	P. leo atrox	Both	-24.3	-29.3	-6.75455	17.98242288	318
Coltrain et al., 2004	0.02	California	USA	34.05	118.2426	Collagen	-19.26	P. leo atrox	Both	-24.26	-29.26	-6.75455	17.94069117	318
Coltrain et al., 2004	0.02	California	USA	34.05	118.2426	Collagen	-19.2	P. leo atrox	Both	-24.2	-29.2	-6.75455	17.87810002	318
Coltrain et al., 2004	0.02	California	USA	34.05	118.2426	Collagen	-19.13	C. dirus	Both	-24.13	-29.13	-6.75455	17.80508674	318
Coltrain et al., 2004	0.02	California	USA	34.05	118.2426	Collagen	-19.13	S. fatalis	Both	-24.13	-29.13	-6.75455	17.80508674	318
Coltrain et al., 2004	0.02	California	USA	34.05	118.2426	Collagen	-19.11	B. antiquus	Grazers	-24.11	-29.11	-6.75455	17.78422773	318
Coltrain et al.,	0.02	California	USA	34.05	118.2426	Collagen	-19.1	S. fatalis	Both	-24.1	-29.1	-6.75455	17.77379854	318

2004														
Coltrain et al., 2004	0.02	California	USA	34.05	118.2426	Collagen	-19.09	S. fatalis	Both	-24.09	-29.09	-6.75455	17.76336957	318
Coltrain et al., 2004	0.02	California	USA	34.05	118.2426	Collagen	-19.06	C. dirus	Both	-24.06	-29.06	-6.75455	17.73208394	318
Coltrain et al., 2004	0.02	California	USA	34.05	118.2426	Collagen	-19.03	C. latrans	Grazers	-24.03	-29.03	-6.75455	17.70080023	318
Coltrain et al., 2004	0.02	California	USA	34.05	118.2426	Collagen	-19.01	S. fatalis	Both	-24.01	-29.01	-6.75455	17.67994549	318
Coltrain et al., 2004	0.02	California	USA	34.05	118.2426	Collagen	-18.93	S. fatalis	Both	-23.93	-28.93	-6.75455	17.59653508	318
Coltrain et al., 2004	0.02	California	USA	34.05	118.2426	Collagen	-18.82	S. fatalis	Both	-23.82	-28.82	-6.75455	17.4818681	318
Coltrain et al., 2004	0.02	California	USA	34.05	118.2426	Collagen	-18.8	C. dirus	Both	-23.8	-28.8	-6.75455	17.46102233	318
Coltrain et al., 2004	0.02	California	USA	34.05	118.2426	Collagen	-18.8	S. fatalis	Both	-23.8	-28.8	-6.75455	17.46102233	318
Coltrain et al., 2004	0.02	California	USA	34.05	118.2426	Collagen	-18.77	C. dirus	Both	-23.77	-28.77	-6.75455	17.42975528	318
Coltrain et al., 2004	0.02	California	USA	34.05	118.2426	Collagen	-18.76	S. fatalis	Both	-23.76	-28.76	-6.75455	17.41933336	318
Coltrain et al., 2004	0.02	California	USA	34.05	118.2426	Collagen	-18.74	P. leo atrox	Both	-23.74	-28.74	-6.75455	17.39849016	318
Coltrain et al., 2004	0.02	California	USA	34.05	118.2426	Collagen	-18.68	S. fatalis	Both	-23.68	-28.68	-6.75455	17.33596567	318
Coltrain et al., 2004	0.02	California	USA	34.05	118.2426	Collagen	-18.67	S. fatalis	Both	-23.67	-28.67	-6.75455	17.32554567	318

Coltrain et al., 2004	0.02	California	USA	34.05	118.2426	Collagen	-18.62	C. dirus	Both	-23.62	-28.62	-6.75455	17.27344886	318
Coltrain et al., 2004	0.02	California	USA	34.05	118.2426	Collagen	-18.58	C. dirus	Both	-23.58	-28.58	-6.75455	17.23177526	318
Coltrain et al., 2004	0.02	California	USA	34.05	118.2426	Collagen	-18.56	P. leo atrox	Both	-23.56	-28.56	-6.75455	17.21093974	318
Coltrain et al., 2004	0.02	California	USA	34.05	118.2426	Collagen	-18.55	C. dirus	Both	-23.55	-28.55	-6.75455	17.2005223	318
Coltrain et al., 2004	0.02	California	USA	34.05	118.2426	Collagen	-18.52	S. fatalis	Both	-23.52	-28.52	-6.75455	17.16927126	318
Coltrain et al., 2004	0.02	California	USA	34.05	118.2426	Collagen	-18.49	S. fatalis	Both	-23.49	-28.49	-6.75455	17.13802214	318
Coltrain et al., 2004	0.02	California	USA	34.05	118.2426	Collagen	-18.46	C. dirus	Both	-23.46	-28.46	-6.75455	17.10677494	318
Coltrain et al., 2004	0.02	California	USA	34.05	118.2426	Collagen	-18.46	C. dirus	Both	-23.46	-28.46	-6.75455	17.10677494	318
Coltrain et al., 2004	0.02	California	USA	34.05	118.2426	Collagen	-18.46	S. fatalis	Both	-23.46	-28.46	-6.75455	17.10677494	318
Coltrain et al., 2004	0.02	California	USA	34.05	118.2426	Collagen	-18.38	C. dirus	Both	-23.38	-28.38	-6.75455	17.02345846	318
Coltrain et al., 2004	0.02	California	USA	34.05	118.2426	Collagen	-18.37	S. fatalis	Both	-23.37	-28.37	-6.75455	17.01304486	318
Coltrain et al., 2004	0.02	California	USA	34.05	118.2426	Collagen	-18.36	C. latrans	Grazers	-23.36	-28.36	-6.75455	17.00263147	318
Coltrain et al., 2004	0.02	California	USA	34.05	118.2426	Collagen	-18.32	S. fatalis	Both	-23.32	-28.32	-6.75455	16.96098005	318
Coltrain	0.02	California	USA	34.05	118.242	Collag	-	P. leo atrox	Both	-	-	-6.75455	16.9505	318

et al., 2004					6	en	18.31			23.31	28.31		6773	
Coltrain et al., 2004	0.02	California	USA	34.05	118.2426	Collagen	-18.25	S. fatalis	Both	-23.25	-28.25	-6.75455	16.88809829	318
Coltrain et al., 2004	0.02	California	USA	34.05	118.2426	Collagen	-18.21	C. dirus	Both	-23.21	-28.21	-6.75455	16.84645625	318
Coltrain et al., 2004	0.02	California	USA	34.05	118.2426	Collagen	-18.17	S. fatalis	Both	-23.17	-28.17	-6.75455	16.80481762	318
Coltrain et al., 2004	0.02	California	USA	34.05	118.2426	Collagen	-18.11	C. dirus	Both	-23.11	-28.11	-6.75455	16.74236608	318
Coltrain et al., 2004	0.02	California	USA	34.05	118.2426	Collagen	-18.1	C. dirus	Both	-23.1	-28.1	-6.75455	16.73195824	318
Coltrain et al., 2004	0.02	California	USA	34.05	118.2426	Collagen	-18.07	C. dirus	Both	-23.07	-28.07	-6.75455	16.70073598	318
Coltrain et al., 2004	0.02	California	USA	34.05	118.2426	Collagen	-17.95	C. dirus	Both	-22.95	-27.95	-6.75455	16.57586613	318
Coltrain et al., 2004	0.02	California	USA	34.05	118.2426	Collagen	-17.94	P. leo atrox	Both	-22.94	-27.94	-6.75455	16.56546169	318
Coltrain et al., 2004	0.02	California	USA	34.05	118.2426	Collagen	-17.81	C. dirus	Both	-22.81	-27.81	-6.75455	16.4302234	318
Coltrain et al., 2004	0.02	California	USA	34.05	118.2426	Collagen	-17.2	S. fatalis	Both	-22.2	-27.2	-6.75455	15.79612395	318
Coltrain et al., 2004	0.02	California	USA	34.05	118.2426	Collagen	-16.95	C. dirus	Both	-21.95	-26.95	-6.75455	15.53647564	318
Coltrain et al., 2004	0.02	California	USA	34.05	118.2426	Collagen	-16.46	S. fatalis	Both	-21.46	-26.46	-6.75455	15.0279498	318
Coltrain et al.,	0.02	California	USA	34.05	118.2426	Collagen	-16.3	C. dirus	Both	-21.39	-26.3	-6.75455	14.95534483	318

2004							9				9			
Kohn et al., 2012	0.02	Wyoming	USA	42.7597	105.3822	tooth enamel	-15.7	Ursus	Grazers	-29.7	-34.7	-6.75455	23.64778934	318
Kohn et al., 2012	0.02	Wyoming	USA	42.7597	105.3822	tooth enamel	-14.9	Arctodus	Grazers	-28.9	-33.9	-6.75455	22.80450005	318
Kohn et al., 2012	0.02	Wyoming	USA	42.7597	105.3822	tooth enamel	-13.9	Lynx	Grazers	-28.4	-33.4	-6.75455	22.27814944	318
Kohn et al., 2012	0.02	Wyoming	USA	44.8375	108.3896	tooth enamel	-13.4	Odocoileus	Browsers	-27.9	-32.9	-6.75455	21.75234029	318
Kohn et al., 2012	0.02	Wyoming	USA	42.7597	105.3822	tooth enamel	-13.3	Taxidea	Grazers	-27.3	-32.3	-6.75455	21.12208286	318
Kohn et al., 2012	0.02	Wyoming	USA	44.8375	108.3896	tooth enamel	-13.1	Arctodus	Grazers	-27.1	-32.1	-6.75455	20.9121698	318
Kohn et al., 2012	0.02	Wyoming	USA	44.8375	108.3896	tooth enamel	-12.3	Vulpes	Grazers	-26.8	-31.8	-6.75455	20.59746198	318
Kohn et al., 2012	0.02	Wyoming	USA	44.8375	108.3896	tooth enamel	-12.7	Gulo	Both	-26.7	-31.7	-6.75455	20.49260249	318
Kohn et al., 2012	0.02	Wyoming	USA	42.7597	105.3822	tooth enamel	-11.8	Vulpes	Grazers	-26.3	-31.3	-6.75455	20.07337989	318
Kohn et al., 2012	0.02	Wyoming	USA	44.8375	108.3896	tooth enamel	-11.6	C. lupus	Both	-26.1	-31.1	-6.75455	19.86389773	318
Kohn et al., 2012	0.02	Wyoming	USA	44.8375	108.3896	tooth enamel	-11.9	Panthera spelaea	Both	-25.9	-30.9	-6.75455	19.65450159	318
Kohn et al., 2012	0.02	Wyoming	USA	44.8375	108.3896	tooth enamel	-11.2	Miracinonyx	Both	-25.7	-30.7	-6.75455	19.44519142	318
Kohn et al., 2012	0.02	Wyoming	USA	42.7597	105.3822	tooth enamel	-11.5	Equus	Grazers	-25.5	-30.5	-6.75455	19.23596716	318

Kohn et al., 2012	0.02	Wyoming	USA	42.7597	105.3822	tooth enamel	-10.9	C. lupus	Both	-25.4	-30.4	-6.75455	19.13138724	318
Kohn et al., 2012	0.02	Wyoming	USA	42.7597	105.3822	tooth enamel	-10.9	Odocoileus	Browsers	-25.4	-30.4	-6.75455	19.13138724	318
Kohn et al., 2012	0.02	Wyoming	USA	42.7597	105.3822	tooth enamel	-10.3	Cervus	Browsers	-24.8	-29.8	-6.75455	18.50435808	318
Kohn et al., 2012	0.02	Wyoming	USA	42.7597	105.3822	tooth enamel	-10.3	Ovis	Grazers	-24.8	-29.8	-6.75455	18.50435808	318
Kohn et al., 2012	0.02	Wyoming	USA	44.8375	108.3896	tooth enamel	-10	Antilocapra	Grazers	-24.5	-29.5	-6.75455	18.19113275	318
Kohn et al., 2012	0.02	Wyoming	USA	44.8375	108.3896	tooth enamel	-10	Bootherium	Grazers	-24.5	-29.5	-6.75455	18.19113275	318
Kohn et al., 2012	0.02	Wyoming	USA	44.8375	108.3896	tooth enamel	-9.9	Cervid	Browsers	-24.4	-29.4	-6.75455	18.08676712	318
Kohn et al., 2012	0.02	Wyoming	USA	44.8375	108.3896	tooth enamel	-10.2	Equus	Grazers	-24.2	-29.2	-6.75455	17.87810002	318
Kohn et al., 2012	0.02	Wyoming	USA	42.7597	105.3822	tooth enamel	-9.4	Felis	Both	-23.9	-28.9	-6.75455	17.56525971	318
Kohn et al., 2012	0.02	Wyoming	USA	44.8375	108.3896	tooth enamel	-9.2	Ovis	Grazers	-23.7	-28.7	-6.75455	17.35680631	318
Kohn et al., 2012	0.02	Wyoming	USA	42.7597	105.3822	tooth enamel	-9.1	Oreamnos	Browsers	-23.6	-28.6	-6.75455	17.25261163	318
Kohn et al., 2012	0.02	Wyoming	USA	44.8375	108.3896	tooth enamel	-9	Camelops	Browsers	-23.5	-28.5	-6.75455	17.1484383	318
Kohn et al., 2012	0.02	Wyoming	USA	44.8375	108.3896	tooth enamel	-9.3	Mammuthus	Grazers	-23.3	-28.3	-6.75455	16.94015563	318
Kohn et	0.02	Wyoming	USA	44.837	108.389	tooth	-8.5	Bos	Grazers	-23	-28	-6.75455	16.6278	318

al., 2012				5	6	enamel							915	
Kohn et al., 2012	0.02	Wyoming	USA	44.8375	108.3896	tooth enamel	-8.3	Bison	Grazers	-22.8	-27.8	-6.75455	16.41982194	318
Kohn et al., 2012	0.02	Wyoming	USA	42.7597	105.3822	tooth enamel	-8.1	Bison	Grazers	-22.6	-27.6	-6.75455	16.21183753	318
Kohn et al., 2012	0.02	Wyoming	USA	44.8375	108.3896	tooth enamel	-7.9	C. latrans	Grazers	-22.4	-27.4	-6.75455	16.00393822	318
Kohn et al., 2012	0.02	Wyoming	USA	44.8375	108.3896	tooth enamel	-8.2	Ursus	Grazers	-22.2	-27.2	-6.75455	15.79612395	318
Castanos et al., 2014	0.021	Spain, Portugal	Europe	43.0756	2.2237	Collagen	-21.52	Cervus elaphus	Browsers	-26.52	-31.52	-6.74909	20.30951843	317.55
Castanos et al., 2014	0.021	Spain, Portugal	Europe	43.0756	2.2237	Collagen	-21.49	Cervus elaphus	Browsers	-26.49	-31.49	-6.74909	20.27807624	317.55
Castanos et al., 2014	0.021	Spain, Portugal	Europe	43.0756	2.2237	Collagen	-21.42	Cervus elaphus	Browsers	-26.42	-31.42	-6.74909	20.20471867	317.55
Castanos et al., 2014	0.021	Spain, Portugal	Europe	43.0756	2.2237	Collagen	-21.28	Cervus elaphus	Browsers	-26.28	-31.28	-6.74909	20.05803516	317.55
Castanos et al., 2014	0.021	Spain, Portugal	Europe	43.0756	2.2237	Collagen	-21.22	Cervus elaphus	Browsers	-26.22	-31.22	-6.74909	19.99518372	317.55
Castanos et al., 2014	0.021	Spain, Portugal	Europe	43.0756	2.2237	Collagen	-21.22	Cervus elaphus	Browsers	-26.22	-31.22	-6.74909	19.99518372	317.55
Castanos et al., 2014	0.021	Spain, Portugal	Europe	43.0756	2.2237	Collagen	-21.21	Bison priscus	Grazers	-26.21	-31.21	-6.74909	19.98470923	317.55
Castanos et al., 2014	0.021	Spain, Portugal	Europe	43.0756	2.2237	Collagen	-21.11	Cervus elaphus	Browsers	-26.11	-31.11	-6.74909	19.87997618	317.55
Castanos et al.,	0.021	Spain, Portugal	Europe	43.0756	2.2237	Collagen	-21.1	Cervus elaphus	Browsers	-26.1	-31.1	-6.74909	19.86950406	317.55

2014														
Castanos et al., 2014	0.021	Spain, Portugal	Europe	43.0756	2.2237	Collagen	-21.06	Bison priscus	Grazers	-26.06	-31.06	-6.74909	19.82761772	317.55
Castanos et al., 2014	0.021	Spain, Portugal	Europe	43.0756	2.2237	Collagen	-21.05	Cervus elaphus	Browsers	-26.05	-31.05	-6.74909	19.81714667	317.55
Castanos et al., 2014	0.021	Spain, Portugal	Europe	43.0756	2.2237	Collagen	-21.05	Cervus elaphus	Browsers	-26.05	-31.05	-6.74909	19.81714667	317.55
Castanos et al., 2014	0.021	Spain, Portugal	Europe	43.0756	2.2237	Collagen	-21.03	Cervus elaphus	Browsers	-26.03	-31.03	-6.74909	19.79620522	317.55
Castanos et al., 2014	0.021	Spain, Portugal	Europe	43.0756	2.2237	Collagen	-21	Cervus elaphus	Browsers	-26	-31	-6.74909	19.76479466	317.55
Castanos et al., 2014	0.021	Spain, Portugal	Europe	43.0756	2.2237	Collagen	-20.91	Cervus elaphus	Browsers	-25.91	-30.91	-6.74909	19.67057459	317.55
Castanos et al., 2014	0.021	Spain, Portugal	Europe	43.0756	2.2237	Collagen	-20.91	Cervus elaphus	Browsers	-25.91	-30.91	-6.74909	19.67057459	317.55
Castanos et al., 2014	0.021	Spain, Portugal	Europe	43.0756	2.2237	Collagen	-20.91	Cervus elaphus	Browsers	-25.91	-30.91	-6.74909	19.67057459	317.55
Castanos et al., 2014	0.021	Spain, Portugal	Europe	43.0756	2.2237	Collagen	-20.91	Cervus elaphus	Browsers	-25.91	-30.91	-6.74909	19.67057459	317.55
Castanos et al., 2014	0.021	Spain, Portugal	Europe	43.0756	2.2237	Collagen	-20.91	Cervus elaphus	Browsers	-25.91	-30.91	-6.74909	19.67057459	317.55
Castanos et al., 2014	0.021	Spain, Portugal	Europe	43.0756	2.2237	Collagen	-20.88	Cervus elaphus	Browsers	-25.88	-30.88	-6.74909	19.63917177	317.55
Castanos et al., 2014	0.021	Spain, Portugal	Europe	43.0756	2.2237	Collagen	-20.86	Cervus elaphus	Browsers	-25.86	-30.86	-6.74909	19.61823762	317.55
Castanos et al., 2014	0.021	Spain, Portugal	Europe	43.0756	2.2237	Collagen	-20.85	Cervus elaphus	Browsers	-25.85	-30.85	-6.74909	19.60777088	317.55

Castanos et al., 2014	0.021	Spain, Portugal	Europe	43.0756	2.2237	Collagen	-20.77	Cervus elaphus	Browsers	-25.77	-30.77	-6.74909	19.52404463	317.55
Castanos et al., 2014	0.021	Spain, Portugal	Europe	43.0756	2.2237	Collagen	-20.71	Cervus elaphus	Browsers	-25.71	-30.71	-6.74909	19.46125897	317.55
Castanos et al., 2014	0.021	Spain, Portugal	Europe	43.0756	2.2237	Collagen	-20.71	Cervus elaphus	Browsers	-25.71	-30.71	-6.74909	19.46125897	317.55
Castanos et al., 2014	0.021	Spain, Portugal	Europe	43.0756	2.2237	Collagen	-20.68	Bison priscus	Grazers	-25.68	-30.68	-6.74909	19.42986904	317.55
Castanos et al., 2014	0.021	Spain, Portugal	Europe	43.0756	2.2237	Collagen	-20.68	Cervus elaphus	Browsers	-25.68	-30.68	-6.74909	19.42986904	317.55
Castanos et al., 2014	0.021	Spain, Portugal	Europe	43.0756	2.2237	Collagen	-20.66	Cervus elaphus	Browsers	-25.66	-30.66	-6.74909	19.40894349	317.55
Castanos et al., 2014	0.021	Spain, Portugal	Europe	43.0756	2.2237	Collagen	-20.66	Cervus elaphus	Browsers	-25.66	-30.66	-6.74909	19.40894349	317.55
Castanos et al., 2014	0.021	Spain, Portugal	Europe	43.0756	2.2237	Collagen	-20.64	Cervus elaphus	Browsers	-25.64	-30.64	-6.74909	19.3880188	317.55
Castanos et al., 2014	0.021	Spain, Portugal	Europe	43.0756	2.2237	Collagen	-20.58	Cervus elaphus	Browsers	-25.58	-30.58	-6.74909	19.32524989	317.55
Castanos et al., 2014	0.021	Spain, Portugal	Europe	43.0756	2.2237	Collagen	-20.25	Cervus elaphus	Browsers	-25.25	-30.25	-6.74909	18.98015902	317.55
Castanos et al., 2014	0.021	Spain, Portugal	Europe	43.0756	2.2237	Collagen	-20.05	Bison priscus	Grazers	-25.05	-30.05	-6.74909	18.77112672	317.55
Castanos et al., 2014	0.021	Spain, Portugal	Europe	43.0756	2.2237	Collagen	-20.05	Rangifer tarandus	Grazers	-25.05	-30.05	-6.74909	18.77112672	317.55
Castanos et al., 2014	0.021	Spain, Portugal	Europe	43.0756	2.2237	Collagen	-20.03	Rangifer tarandus	Grazers	-25.03	-30.03	-6.74909	18.75022821	317.55
Castano	0.021	Spain,	Europ	43.075	2.2237	Collag	-19.9	Rangifer	Grazers	-24.9	-	-6.74909	18.6144	317.5

s et al., 2014		Portugal	e	6		en		tarandus			29.9		0878	5
Castanos et al., 2014	0.021	Spain, Portugal	Europe	43.0756	2.2237	Collagen	-19.75	Rangifer tarandus	Grazers	-24.75	-29.75	-6.74909	18.45773904	317.55
Castanos et al., 2014	0.021	Spain, Portugal	Europe	43.0756	2.2237	Collagen	-19.65	Rangifer tarandus	Grazers	-24.65	-29.65	-6.74909	18.35331932	317.55
Castanos et al., 2014	0.021	Spain, Portugal	Europe	43.0756	2.2237	Collagen	-19.57	Rangifer tarandus	Grazers	-24.57	-29.57	-6.74909	18.26979896	317.55
Castanos et al., 2014	0.021	Spain, Portugal	Europe	43.0756	2.2237	Collagen	-19.53	Rangifer tarandus	Grazers	-24.53	-29.53	-6.74909	18.22804392	317.55
Castanos et al., 2014	0.021	Spain, Portugal	Europe	43.0756	2.2237	Collagen	-19.28	Rangifer tarandus	Grazers	-24.28	-29.28	-6.74909	17.96715246	317.55
Castanos et al., 2014	0.021	Spain, Portugal	Europe	43.0756	2.2237	Collagen	-19.02	Rangifer tarandus	Grazers	-24.02	-29.02	-6.74909	17.69596713	317.55
Iacumin et al., 1997	0.023	Paglicci cave	Italy	41.654	15.6153	Collagen	-20.5	Mammal	Grazers	-25.5	-30.5	-6.73818	19.25276552	316.65
Bocherens et al., 2011	0.024	Kesslerloch	Europe	47.7452	8.6934	Collagen	-21.4	Hare	Browsers	-26.4	-31.4	-6.73273	20.20056491	316.2
Bocherens et al., 2011	0.024	Kesslerloch	Europe	47.7452	8.6934	Collagen	-21.3	Mammoth	Grazers	-26.3	-31.3	-6.73273	20.09578926	316.2
Bocherens et al., 2011	0.024	Schussenquelle	Europe	48.119	9.3929	Collagen	-21.2	Horse	Grazers	-26.2	-31.2	-6.73273	19.99103512	316.2
Bocherens et al., 2011	0.024	Kesslerloch	Europe	47.7452	8.6934	Collagen	-21	Ground squirrel	Grazers	-26	-31	-6.73273	19.78159138	316.2
Bocher	0.024	Kesslerloc	Europ	47.745	8.6934	Collag	-20.9	Ground	Grazers	-25.9	-	-6.73273	19.6769	316.2

ens et al., 2011		h	e	2		en		squirrel			30.9		0176	
Bocherens et al., 2011	0.024	Kesslerloch	Europe	47.7452	8.6934	Collagen	-20.9	Hare	Browsers	-25.9	-30.9	-6.73273	19.67690176	316.2
Bocherens et al., 2011	0.024	Bavans	Europe	47.483129	6.729747	Collagen	-20.8	Cerf	Browsers	-25.8	-30.8	-6.73273	19.57223363	316.2
Bocherens et al., 2011	0.024	Kesslerloch	Europe	47.7452	8.6934	Collagen	-20.8	Ground squirrel	Grazers	-25.8	-30.8	-6.73273	19.57223363	316.2
Bocherens et al., 2011	0.024	Kesslerloch	Europe	47.7452	8.6934	Collagen	-20.8	Hare	Browsers	-25.8	-30.8	-6.73273	19.57223363	316.2
Bocherens et al., 2011	0.024	Kesslerloch	Europe	47.7452	8.6934	Collagen	-20.8	Hare	Browsers	-25.8	-30.8	-6.73273	19.57223363	316.2
Bocherens et al., 2011	0.024	Schussenquelle	Europe	48.119	9.3929	Collagen	-20.6	Bear	Grazers	-25.6	-30.6	-6.73273	19.36296182	316.2
Bocherens et al., 2011	0.024	Rochedane	Europe	47.356348	6.758298	Collagen	-20.6	Cerf	Browsers	-25.6	-30.6	-6.73273	19.36296182	316.2
Bocherens et al., 2011	0.024	Kesslerloch	Europe	47.7452	8.6934	Collagen	-20.6	Hare	Browsers	-25.6	-30.6	-6.73273	19.36296182	316.2
Bocherens et al., 2011	0.024	Kesslerloch	Europe	47.7452	8.6934	Collagen	-20.6	Horse	Grazers	-25.6	-30.6	-6.73273	19.36296182	316.2
Bocher	0.024	Monruz	Europ	47.003	6.96153	Collag	-20.6	Horse	Grazers	-25.6	-	-6.73273	19.3629	316.2

ens et al., 2011			e	687	9	en					30.6		6182	
Bocherens et al., 2011	0.024	Kesslerloch	Europe	47.7452	8.6934	Collagen	-20.5	Hare	Browsers	-25.5	-30.5	-6.73273	19.25835813	316.2
Bocherens et al., 2011	0.024	Kesslerloch	Europe	47.7452	8.6934	Collagen	-20.5	Hare	Browsers	-25.5	-30.5	-6.73273	19.25835813	316.2
Bocherens et al., 2011	0.024	Kesslerloch	Europe	47.7452	8.6934	Collagen	-20.5	Hare	Browsers	-25.5	-30.5	-6.73273	19.25835813	316.2
Bocherens et al., 2011	0.024	Kesslerloch	Europe	47.7452	8.6934	Collagen	-20.5	Mammoth	Grazers	-25.5	-30.5	-6.73273	19.25835813	316.2
Bocherens et al., 2011	0.024	Rochedane	Europe	47.356348	6.758298	Collagen	-20.4	Cerf	Browsers	-25.4	-30.4	-6.73273	19.15377591	316.2
Bocherens et al., 2011	0.024	Kesslerloch	Europe	47.7452	8.6934	Collagen	-20.4	Hare	Browsers	-25.4	-30.4	-6.73273	19.15377591	316.2
Bocherens et al., 2011	0.024	Kesslerloch	Europe	47.7452	8.6934	Collagen	-20.4	Hare	Browsers	-25.4	-30.4	-6.73273	19.15377591	316.2
Bocherens et al., 2011	0.024	Kesslerloch	Europe	47.7452	8.6934	Collagen	-20.4	Hare	Browsers	-25.4	-30.4	-6.73273	19.15377591	316.2
Bocherens et al., 2011	0.024	Kesslerloch	Europe	47.7452	8.6934	Collagen	-20.4	Hare	Browsers	-25.4	-30.4	-6.73273	19.15377591	316.2
Bocher	0.024	Kesslerloc	Europ	47.745	8.6934	Collag	-20.4	Hare	Browsers	-25.4	-	-6.73273	19.1537	316.2

ens et al., 2011		h	e	2		en					30.4		7591	
Bocherens et al., 2011	0.024	Kesslerloch	Europe	47.7452	8.6934	Collagen	-20.4	Hare	Browsers	-25.4	-30.4	-6.73273	19.15377591	316.2
Bocherens et al., 2011	0.024	Kesslerloch	Europe	47.7452	8.6934	Collagen	-20.4	Horse	Grazers	-25.4	-30.4	-6.73273	19.15377591	316.2
Bocherens et al., 2011	0.024	Monruz	Europe	47.003687	6.961539	Collagen	-20.4	Horse	Grazers	-25.4	-30.4	-6.73273	19.15377591	316.2
Bocherens et al., 2011	0.024	Schussenquelle	Europe	48.119	9.3929	Collagen	-20.3	Bear	Grazers	-25.3	-30.3	-6.73273	19.04921514	316.2
Bocherens et al., 2011	0.024	Kesslerloch	Europe	47.7452	8.6934	Collagen	-20.3	Bison sp.	Grazers	-25.3	-30.3	-6.73273	19.04921514	316.2
Bocherens et al., 2011	0.024	Kesslerloch	Europe	47.7452	8.6934	Collagen	-20.3	Ground squirrel	Grazers	-25.3	-30.3	-6.73273	19.04921514	316.2
Bocherens et al., 2011	0.024	Kesslerloch	Europe	47.7452	8.6934	Collagen	-20.3	Hare	Browsers	-25.3	-30.3	-6.73273	19.04921514	316.2
Bocherens et al., 2011	0.024	Kesslerloch	Europe	47.7452	8.6934	Collagen	-20.3	Horse	Grazers	-25.3	-30.3	-6.73273	19.04921514	316.2
Bocherens et al., 2011	0.024	Kesslerloch	Europe	47.7452	8.6934	Collagen	-20.3	Reindeer	Browsers	-25.3	-30.3	-6.73273	19.04921514	316.2
Bocher	0.024	Rochedane	Europ	47.356	6.75829	Collag	-20.3	Reindeer	Browsers	-25.3	-	-6.73273	19.0492	316.2

ens et al., 2011			e	348	8	en					30.3		1514	
Bocher ens et al., 2011	0.024	Grotte de Chaze	Europ e	41.469 858	- 71.2982 65	Collag en	-20.3	Rhinoceros	Browsers	-25.3	- 30.3	-6.73273	19.0492 1514	316.2
Bocher ens et al., 2011	0.024	Schussenq uelle	Europ e	48.119	9.3929	Collag en	-20.3	wolf	Both	-25.3	- 30.3	-6.73273	19.0492 1514	316.2
Bocher ens et al., 2011	0.024	Kesslerloc h	Europ e	47.745 2	8.6934	Collag en	-20.2	Cerf	Browsers	-25.2	- 30.2	-6.73273	18.9446 7583	316.2
Bocher ens et al., 2011	0.024	Schussenq uelle	Europ e	48.119	9.3929	Collag en	-20.2	Elk	Grazers	-25.2	- 30.2	-6.73273	18.9446 7583	316.2
Bocher ens et al., 2011	0.024	Kesslerloc h	Europ e	47.745 2	8.6934	Collag en	-20.2	Hare	Browsers	-25.2	- 30.2	-6.73273	18.9446 7583	316.2
Bocher ens et al., 2011	0.024	Kesslerloc h	Europ e	47.745 2	8.6934	Collag en	-20.2	Hare	Browsers	-25.2	- 30.2	-6.73273	18.9446 7583	316.2
Bocher ens et al., 2011	0.024	Kesslerloc h	Europ e	47.745 2	8.6934	Collag en	-20.2	Hare	Browsers	-25.2	- 30.2	-6.73273	18.9446 7583	316.2
Bocher ens et al., 2011	0.024	Kesslerloc h	Europ e	47.745 2	8.6934	Collag en	-20.2	Hare	Browsers	-25.2	- 30.2	-6.73273	18.9446 7583	316.2
Bocher ens et al., 2011	0.024	Kesslerloc h	Europ e	47.745 2	8.6934	Collag en	-20.2	Hare	Browsers	-25.2	- 30.2	-6.73273	18.9446 7583	316.2
Bocher	0.024	Kesslerloc	Europ	47.745	8.6934	Collag	-20.2	Hare	Browsers	-25.2	-	-6.73273	18.9446	316.2

ens et al., 2011		h	e	2		en					30.2		7583	
Bocherens et al., 2011	0.024	Kesslerloch	Europe	47.7452	8.6934	Collagen	-20.2	Horse	Grazers	-25.2	-30.2	-6.73273	18.94467583	316.2
Bocherens et al., 2011	0.024	Fellstalle	Europe	48.3792	9.7543	Collagen	-20.2	Reindeer	Browsers	-25.2	-30.2	-6.73273	18.94467583	316.2
Bocherens et al., 2011	0.024	Petersfels	Europe	49.096536	7.706664	Collagen	-20.2	Reindeer	Browsers	-25.2	-30.2	-6.73273	18.94467583	316.2
Bocherens et al., 2011	0.024	Kesslerloch	Europe	47.7452	8.6934	Collagen	-20.2	wolverine	Grazers	-25.2	-30.2	-6.73273	18.94467583	316.2
Bocherens et al., 2011	0.024	Kesslerloch	Europe	47.7452	8.6934	Collagen	-20.1	Hare	Browsers	-25.1	-30.1	-6.73273	18.84015796	316.2
Bocherens et al., 2011	0.024	Champreveyres	Europe	47.00912	6.969253	Collagen	-20.1	Horse	Grazers	-25.1	-30.1	-6.73273	18.84015796	316.2
Bocherens et al., 2011	0.024	Schussenquelle	Europe	48.119	9.3929	Collagen	-20.1	Reindeer	Browsers	-25.1	-30.1	-6.73273	18.84015796	316.2
Bocherens et al., 2011	0.024	Kesslerloch	Europe	47.7452	8.6934	Collagen	-20.1	wolverine	Grazers	-25.1	-30.1	-6.73273	18.84015796	316.2
Bocherens et al., 2011	0.024	Kesslerloch	Europe	47.7452	8.6934	Collagen	-20	Bison sp.	Grazers	-25	-30	-6.73273	18.73566154	316.2
Bocher	0.024	Kesslerloc	Europ	47.745	8.6934	Collag	-20	Horse	Grazers	-25	-30	-6.73273	18.7356	316.2

ens et al., 2011		h	e	2		en							6154	
Bocherens et al., 2011	0.024	Petersfels	Europe	49.096536	7.706664	Collagen	-20	Reindeer	Browsers	-25	-30	-6.73273	18.73566154	316.2
Bocherens et al., 2011	0.024	Petersfels	Europe	49.096536	7.706664	Collagen	-20	Reindeer	Browsers	-25	-30	-6.73273	18.73566154	316.2
Bocherens et al., 2011	0.024	Rochedane	Europe	47.356348	6.758298	Collagen	-19.9	Cerf	Browsers	-24.9	-29.9	-6.73273	18.63118654	316.2
Bocherens et al., 2011	0.024	Kesslerloch	Europe	47.7452	8.6934	Collagen	-19.9	Reindeer	Browsers	-24.9	-29.9	-6.73273	18.63118654	316.2
Bocherens et al., 2011	0.024	Kesslerloch	Europe	47.7452	8.6934	Collagen	-19.9	Reindeer	Browsers	-24.9	-29.9	-6.73273	18.63118654	316.2
Bocherens et al., 2011	0.024	Petersfels	Europe	49.096536	7.706664	Collagen	-19.9	Reindeer	Browsers	-24.9	-29.9	-6.73273	18.63118654	316.2
Bocherens et al., 2011	0.024	Petersfels	Europe	49.096536	7.706664	Collagen	-19.9	Reindeer	Browsers	-24.9	-29.9	-6.73273	18.63118654	316.2
Bocherens et al., 2011	0.024	Petersfels	Europe	49.096536	7.706664	Collagen	-19.9	Reindeer	Browsers	-24.9	-29.9	-6.73273	18.63118654	316.2
Bocherens et al., 2011	0.024	Kesslerloch	Europe	47.7452	8.6934	Collagen	-19.9	Rhinoceros	Browsers	-24.9	-29.9	-6.73273	18.63118654	316.2
Bocher	0.024	Kesslerloc	Europ	47.745	8.6934	Collag	-19.8	Bison sp.	Grazers	-24.8	-	-6.73273	18.5267	316.2

ens et al., 2011		h	e	2		en					29.8		3298	
Bocherens et al., 2011	0.024	Schussenquelle	Europe	48.119	9.3929	Collagen	-19.8	Elk	Grazers	-24.8	-29.8	-6.73273	18.52673298	316.2
Bocherens et al., 2011	0.024	Champrevеyres	Europe	47.00912	6.969253	Collagen	-19.8	Horse	Grazers	-24.8	-29.8	-6.73273	18.52673298	316.2
Bocherens et al., 2011	0.024	Fellstalle	Europe	48.3792	9.7543	Collagen	-19.8	Reindeer	Browsers	-24.8	-29.8	-6.73273	18.52673298	316.2
Bocherens et al., 2011	0.024	Kesslerloch	Europe	47.7452	8.6934	Collagen	-19.8	Reindeer	Browsers	-24.8	-29.8	-6.73273	18.52673298	316.2
Bocherens et al., 2011	0.024	Petersfels	Europe	49.096536	7.706664	Collagen	-19.8	Reindeer	Browsers	-24.8	-29.8	-6.73273	18.52673298	316.2
Bocherens et al., 2011	0.024	Schussenquelle	Europe	48.119	9.3929	Collagen	-19.8	Reindeer	Browsers	-24.8	-29.8	-6.73273	18.52673298	316.2
Bocherens et al., 2011	0.024	Kesslerloch	Europe	47.7452	8.6934	Collagen	-19.7	Hare	Browsers	-24.7	-29.7	-6.73273	18.42230083	316.2
Bocherens et al., 2011	0.024	Buttentalhohle	Europe	49.096536	7.706664	Collagen	-19.7	Reindeer	Browsers	-24.7	-29.7	-6.73273	18.42230083	316.2
Bocherens et al., 2011	0.024	Petersfels	Europe	49.096536	7.706664	Collagen	-19.7	Reindeer	Browsers	-24.7	-29.7	-6.73273	18.42230083	316.2
Bocher	0.024	Petersfels	Europ	49.096	7.70666	Collag	-19.7	Reindeer	Browsers	-24.7	-	-6.73273	18.4223	316.2

ens et al., 2011			e	536	4	en					29.7		0083	
Bocherens et al., 2011	0.024	Petersfels	Europe	49.096536	7.706664	Collagen	-19.7	Reindeer	Browsers	-24.7	-29.7	-6.73273	18.42230083	316.2
Bocherens et al., 2011	0.024	Petersfels	Europe	49.096536	7.706664	Collagen	-19.7	Reindeer	Browsers	-24.7	-29.7	-6.73273	18.42230083	316.2
Bocherens et al., 2011	0.024	Rochedane	Europe	47.356348	6.758298	Collagen	-19.7	Reindeer	Browsers	-24.7	-29.7	-6.73273	18.42230083	316.2
Bocherens et al., 2011	0.024	Schussenquelle	Europe	48.119	9.3929	Collagen	-19.7	Reindeer	Browsers	-24.7	-29.7	-6.73273	18.42230083	316.2
Bocherens et al., 2011	0.024	Kesslerloch	Europe	47.7452	8.6934	Collagen	-19.6	fox	Grazers	-24.6	-29.6	-6.73273	18.3178901	316.2
Bocherens et al., 2011	0.024	GeiBenklosterle	Europe	48.3792	9.7543	Collagen	-19.6	Reindeer	Browsers	-24.6	-29.6	-6.73273	18.3178901	316.2
Bocherens et al., 2011	0.024	Petersfels	Europe	49.096536	7.706664	Collagen	-19.6	Reindeer	Browsers	-24.6	-29.6	-6.73273	18.3178901	316.2
Bocherens et al., 2011	0.024	Petersfels	Europe	49.096536	7.706664	Collagen	-19.6	Reindeer	Browsers	-24.6	-29.6	-6.73273	18.3178901	316.2
Bocherens et al., 2011	0.024	Grotte de la Baume Noire	Europe	47.460657	5.941737	Collagen	-19.5	Reindeer	Browsers	-24.5	-29.5	-6.73273	18.21350077	316.2
Bocher	0.024	Grotte du	Europ	48.806	2.11854	Collag	-19.5	Reindeer	Browsers	-24.5	-	-6.73273	18.2135	316.2

ens et al., 2011		Chaumois-Boiv	e	643	3	en					29.5		0077	
Bocherens et al., 2011	0.024	Petersfels	Europe	49.096536	7.706664	Collagen	-19.5	Reindeer	Browsers	-24.5	-29.5	-6.73273	18.21350077	316.2
Bocherens et al., 2011	0.024	Rochedane	Europe	47.356348	6.758298	Collagen	-19.5	Reindeer	Browsers	-24.5	-29.5	-6.73273	18.21350077	316.2
Bocherens et al., 2011	0.024	Schussenquelle	Europe	48.119	9.3929	Collagen	-19.5	Reindeer	Browsers	-24.5	-29.5	-6.73273	18.21350077	316.2
Bocherens et al., 2011	0.024	Kesslerloch	Europe	47.7452	8.6934	Collagen	-19.4	lynx	Grazers	-24.4	-29.4	-6.73273	18.10913284	316.2
Bocherens et al., 2011	0.024	GeiBenklosterle	Europe	48.3792	9.7543	Collagen	-19.4	Reindeer	Browsers	-24.4	-29.4	-6.73273	18.10913284	316.2
Bocherens et al., 2011	0.024	Hohle Fels	Europe	48.3792	9.7543	Collagen	-19.4	Reindeer	Browsers	-24.4	-29.4	-6.73273	18.10913284	316.2
Bocherens et al., 2011	0.024	Petersfels	Europe	49.096536	7.706664	Collagen	-19.4	Reindeer	Browsers	-24.4	-29.4	-6.73273	18.10913284	316.2
Bocherens et al., 2011	0.024	Petersfels	Europe	49.096536	7.706664	Collagen	-19.4	Reindeer	Browsers	-24.4	-29.4	-6.73273	18.10913284	316.2
Bocherens et al., 2011	0.024	Schussenquelle	Europe	48.119	9.3929	Collagen	-19.4	Reindeer	Browsers	-24.4	-29.4	-6.73273	18.10913284	316.2
Bocher	0.024	Hohle Fels	Europ	48.379	9.7543	Collag	-19.3	Bear	Grazers	-24.3	-	-6.73273	18.0047	316.2

ens et al., 2011			e	2		en					29.3		8631	
Bocherens et al., 2011	0.024	Fellstalle	Europe	48.3792	9.7543	Collagen	-19.3	Reindeer	Browsers	-24.3	-29.3	-6.73273	18.00478631	316.2
Bocherens et al., 2011	0.024	Petersfels	Europe	49.096536	7.706664	Collagen	-19.3	Reindeer	Browsers	-24.3	-29.3	-6.73273	18.00478631	316.2
Bocherens et al., 2011	0.024	Rochedane	Europe	47.356348	6.758298	Collagen	-19.3	Reindeer	Browsers	-24.3	-29.3	-6.73273	18.00478631	316.2
Bocherens et al., 2011	0.024	Grotte Grappin	Europe	51.224809	6.469302	Collagen	-19.1	Reindeer	Browsers	-24.1	-29.1	-6.73273	17.79615739	316.2
Bocherens et al., 2011	0.024	Kesslerloch	Europe	47.7452	8.6934	Collagen	-19.1	Reindeer	Browsers	-24.1	-29.1	-6.73273	17.79615739	316.2
Bocherens et al., 2011	0.024	Petersfels	Europe	49.096536	7.706664	Collagen	-19.1	Reindeer	Browsers	-24.1	-29.1	-6.73273	17.79615739	316.2
Bocherens et al., 2011	0.024	Petersfels	Europe	49.096536	7.706664	Collagen	-19.1	Reindeer	Browsers	-24.1	-29.1	-6.73273	17.79615739	316.2
Bocherens et al., 2011	0.024	Ranchot	Europe	47.1496	5.7245	Collagen	-19.1	Reindeer	Browsers	-24.1	-29.1	-6.73273	17.79615739	316.2
Bocherens et al., 2011	0.024	Kesslerloch	Europe	47.7452	8.6934	Collagen	-19.1	wolf	Both	-24.1	-29.1	-6.73273	17.79615739	316.2
Bocher	0.024	Kesslerloc	Europ	47.745	8.6934	Collag	-19	wolf	Both	-24	-29	-6.73273	17.6918	316.2

ens et al., 2011		h	e	2		en							75	
Bocherens et al., 2011	0.024	Kesslerloch	Europe	47.7452	8.6934	Collagen	-18.8	Cave lion	Both	-23.8	-28.8	-6.73273	17.48337431	316.2
Bocherens et al., 2011	0.024	Buttentalhohle	Europe	47.7452	8.6934	Collagen	-18.7	Bear	Grazers	-23.7	-28.7	-6.73273	17.379156	316.2
Bocherens et al., 2011	0.024	Kesslerloch	Europe	47.7452	8.6934	Collagen	-18.5	Cave lion	Both	-23.5	-28.5	-6.73273	17.17078341	316.2
Bocherens et al., 2011	0.024	Ranchot	Europe	47.1496	5.7245	Collagen	-18.4	Cave lion	Both	-23.4	-28.4	-6.73273	17.06662912	316.2
Fox-Dobbs et al., 2008	0.03	Alaska	USA	64.2008	149.4937	Collagen	-24.16	Bos	Grazers	-29.16	-34.16	-6.7	23.13460508	313.5
Fox-Dobbs et al., 2008	0.03	Alaska	USA	64.2008	149.4937	Collagen	-21.87	Equus	Grazers	-26.87	-31.87	-6.7	20.72693268	313.5
Fox-Dobbs et al., 2008	0.03	Alaska	USA	64.2008	149.4937	Collagen	-21.7	Equus	Grazers	-26.7	-31.7	-6.7	20.54864893	313.5
Fox-Dobbs et al., 2008	0.03	Alaska	USA	64.2008	149.4937	Collagen	-21.68	Bos	Grazers	-26.68	-31.68	-6.7	20.52767846	313.5
Fox-Dobbs et al., 2008	0.03	Alaska	USA	64.2008	149.4937	Collagen	-21.58	Equus	Grazers	-26.58	-31.58	-6.7	20.42283906	313.5
Fox-	0.03	Alaska	USA	64.200	149.493	Collag	-21.5	Equus	Grazers	-26.5	-	-6.7	20.3389	313.5

Dobbs et al., 2008				8	7	en					31.5		8305	
Fox-Dobbs et al., 2008	0.03	Alaska	USA	64.2008	149.4937	Collagen	-21.5	Equus	Grazers	-26.5	-31.5	-6.7	20.33898305	313.5
Fox-Dobbs et al., 2008	0.03	Alaska	USA	64.2008	149.4937	Collagen	-21.48	Equus	Grazers	-26.48	-31.48	-6.7	20.3180212	313.5
Fox-Dobbs et al., 2008	0.03	Alaska	USA	64.2008	149.4937	Collagen	-21.45	Equus	Grazers	-26.45	-31.45	-6.7	20.28658004	313.5
Fox-Dobbs et al., 2008	0.03	Alaska	USA	64.2008	149.4937	Collagen	-21.4	Equus	Grazers	-26.4	-31.4	-6.7	20.23418242	313.5
Fox-Dobbs et al., 2008	0.03	Alaska	USA	64.2008	149.4937	Collagen	-21.34	Bison	Grazers	-26.34	-31.34	-6.7	20.17131237	313.5
Fox-Dobbs et al., 2008	0.03	Alaska	USA	64.2008	149.4937	Collagen	-21.32	Equus	Grazers	-26.32	-31.32	-6.7	20.15035741	313.5
Fox-Dobbs et al., 2008	0.03	Alaska	USA	64.2008	149.4937	Collagen	-21.3	Mammuthus	Grazers	-26.3	-31.3	-6.7	20.12940331	313.5
Fox-Dobbs et al., 2008	0.03	Alaska	USA	64.2008	149.4937	Collagen	-21.29	Equus	Grazers	-26.29	-31.29	-6.7	20.11892658	313.5
Fox-Dobbs et al., 2008	0.03	Alaska	USA	64.2008	149.4937	Collagen	-21.28	Equus	Grazers	-26.28	-31.28	-6.7	20.10845007	313.5
Fox-	0.03	Alaska	USA	64.200	149.493	Collag	-	Bos	Grazers	-	-	-6.7	20.0874	313.5

Dobbs et al., 2008				8	7	en	21.2 6			26.26	31.2 6		9769	
Fox-Dobbs et al., 2008	0.03	Alaska	USA	64.200 8	149.493 7	Collag en	- 21.2 5	Equus	Grazers	- 26.25	- 31.2 5	-6.7	20.0770 2182	313.5
Fox-Dobbs et al., 2008	0.03	Alaska	USA	64.200 8	149.493 7	Collag en	- 21.2 5	Equus	Grazers	- 26.25	- 31.2 5	-6.7	20.0770 2182	313.5
Fox-Dobbs et al., 2008	0.03	Alaska	USA	64.200 8	149.493 7	Collag en	- 21.2 3	Equus	Grazers	- 26.23	- 31.2 3	-6.7	20.0560 7074	313.5
Fox-Dobbs et al., 2008	0.03	Alaska	USA	64.200 8	149.493 7	Collag en	-21.2	Equus	Grazers	-26.2	- 31.2	-6.7	20.0246 4572	313.5
Fox-Dobbs et al., 2008	0.03	Alaska	USA	64.200 8	149.493 7	Collag en	-21.2	Mammuthus	Grazers	-26.2	- 31.2	-6.7	20.0246 4572	313.5
Fox-Dobbs et al., 2008	0.03	Alaska	USA	64.200 8	149.493 7	Collag en	- 21.1 9	Equus	Grazers	- 26.19	- 31.1 9	-6.7	20.0141 7114	313.5
Fox-Dobbs et al., 2008	0.03	Alaska	USA	64.200 8	149.493 7	Collag en	-21.1	Mammuthus	Grazers	-26.1	- 31.1	-6.7	19.9199 0964	313.5
Fox-Dobbs et al., 2008	0.03	Alaska	USA	64.200 8	149.493 7	Collag en	- 21.0 9	Equus	Grazers	- 26.09	- 31.0 9	-6.7	19.9094 3722	313.5
Fox-Dobbs et al., 2008	0.03	Alaska	USA	64.200 8	149.493 7	Collag en	- 21.0 7	Equus	Grazers	- 26.07	- 31.0 7	-6.7	19.8884 9301	313.5
Fox-	0.03	Alaska	USA	64.200	149.493	Collag	-	Equus	Grazers	-	-	-6.7	19.8675	313.5

Dobbs et al., 2008				8	7	en	21.05			26.05	31.05		4967	
Fox-Dobbs et al., 2008	0.03	Alaska	USA	64.2008	149.4937	Collagen	-21.03	Equus	Grazers	-26.03	-31.03	-6.7	19.84660719	313.5
Fox-Dobbs et al., 2008	0.03	Alaska	USA	64.2008	149.4937	Collagen	-21	Mammuthus	Grazers	-26	-31	-6.7	19.81519507	313.5
Fox-Dobbs et al., 2008	0.03	Alaska	USA	64.2008	149.4937	Collagen	-20.97	Equus	Grazers	-25.97	-30.97	-6.7	19.78378489	313.5
Fox-Dobbs et al., 2008	0.03	Alaska	USA	64.2008	149.4937	Collagen	-20.95	Equus	Grazers	-25.95	-30.95	-6.7	19.76284585	313.5
Fox-Dobbs et al., 2008	0.03	Alaska	USA	64.2008	149.4937	Collagen	-20.94	Symbos	N.A.	-25.94	-30.94	-6.7	19.75237665	313.5
Fox-Dobbs et al., 2008	0.03	Alaska	USA	64.2008	149.4937	Collagen	-20.93	Equus	Grazers	-25.93	-30.93	-6.7	19.74190767	313.5
Fox-Dobbs et al., 2008	0.03	Alaska	USA	64.2008	149.4937	Collagen	-20.9	Equus	Grazers	-25.9	-30.9	-6.7	19.710502	313.5
Fox-Dobbs et al., 2008	0.03	Alaska	USA	64.2008	149.4937	Collagen	-20.89	Equus	Grazers	-25.89	-30.89	-6.7	19.70003388	313.5
Fox-Dobbs et al., 2008	0.03	Alaska	USA	64.2008	149.4937	Collagen	-20.88	Bison	Grazers	-25.88	-30.88	-6.7	19.68956597	313.5
Fox-	0.03	Alaska	USA	64.200	149.493	Collag	-	Equus	Grazers	-	-	-6.7	19.6790	313.5

Dobbs et al., 2008				8	7	en	20.87			25.87	30.87		9827	
Fox-Dobbs et al., 2008	0.03	Alaska	USA	64.2008	149.4937	Collagen	-20.85	Equus	Grazers	-25.85	-30.85	-6.7	19.65816353	313.5
Fox-Dobbs et al., 2008	0.03	Alaska	USA	64.2008	149.4937	Collagen	-20.81	Equus	Grazers	-25.81	-30.81	-6.7	19.61629662	313.5
Fox-Dobbs et al., 2008	0.03	Alaska	USA	64.2008	149.4937	Collagen	-20.8	Mammuthus	Grazers	-25.8	-30.8	-6.7	19.60583042	313.5
Fox-Dobbs et al., 2008	0.03	Alaska	USA	64.2008	149.4937	Collagen	-20.76	Equus	Grazers	-25.76	-30.76	-6.7	19.56396781	313.5
Fox-Dobbs et al., 2008	0.03	Alaska	USA	64.2008	149.4937	Collagen	-20.73	Bos	Grazers	-25.73	-30.73	-6.7	19.53257311	313.5
Fox-Dobbs et al., 2008	0.03	Alaska	USA	64.2008	149.4937	Collagen	-20.72	Symbos	N.A.	-25.72	-30.72	-6.7	19.52210863	313.5
Fox-Dobbs et al., 2008	0.03	Alaska	USA	64.2008	149.4937	Collagen	-20.7	Equus	Grazers	-25.7	-30.7	-6.7	19.50118033	313.5
Fox-Dobbs et al., 2008	0.03	Alaska	USA	64.2008	149.4937	Collagen	-20.7	Equus	Grazers	-25.7	-30.7	-6.7	19.50118033	313.5
Fox-Dobbs et al., 2008	0.03	Alaska	USA	64.2008	149.4937	Collagen	-20.63	Equus	Grazers	-25.63	-30.63	-6.7	19.42793805	313.5
Fox-	0.03	Alaska	USA	64.200	149.493	Collag	-	Bison	Grazers	-	-	-6.7	19.3024	313.5

Dobbs et al., 2008				8	7	en	20.51			25.51	30.51		0433	
Fox-Dobbs et al., 2008	0.03	Alaska	USA	64.2008	149.4937	Collagen	-20.38	Bos	Grazers	-25.38	-30.38	-6.7	19.16644436	313.5
Fox-Dobbs et al., 2008	0.03	Alaska	USA	64.2008	149.4937	Collagen	-20.36	Symbos	N.A.	-25.36	-30.36	-6.7	19.14553066	313.5
Fox-Dobbs et al., 2008	0.03	Alaska	USA	64.2008	149.4937	Collagen	-20.32	Symbos	N.A.	-25.32	-30.32	-6.7	19.10370583	313.5
Fox-Dobbs et al., 2008	0.03	Alaska	USA	64.2008	149.4937	Collagen	-20.19	Symbos	N.A.	-25.19	-30.19	-6.7	18.96779885	313.5
Fox-Dobbs et al., 2008	0.03	Alaska	USA	64.2008	149.4937	Collagen	-20.1	Bison	Grazers	-25.1	-30.1	-6.7	18.87373064	313.5
Fox-Dobbs et al., 2008	0.03	Alaska	USA	64.2008	149.4937	Collagen	-20.08	Bison	Grazers	-25.08	-30.08	-6.7	18.85282895	313.5
Fox-Dobbs et al., 2008	0.03	Alaska	USA	64.2008	149.4937	Collagen	-20.08	Rangifer	Grazers	-25.08	-30.08	-6.7	18.85282895	313.5
Fox-Dobbs et al., 2008	0.03	Alaska	USA	64.2008	149.4937	Collagen	-20.07	Rangifer	Grazers	-25.07	-30.07	-6.7	18.84237843	313.5
Fox-Dobbs et al., 2008	0.03	Alaska	USA	64.2008	149.4937	Collagen	-19.96	Symbos	N.A.	-24.96	-29.96	-6.7	18.72743682	313.5
Fox-	0.03	Alaska	USA	64.200	149.493	Collag	-	Symbos	N.A.	-	-	-6.7	18.6856	313.5

Dobbs et al., 2008				8	7	en	19.92			24.92	29.92		4631	
Fox-Dobbs et al., 2008	0.03	Alaska	USA	64.2008	149.4937	Collagen	-19.89	Symbos	N.A.	-24.89	-29.89	-6.7	18.65430567	313.5
Fox-Dobbs et al., 2008	0.03	Alaska	USA	64.2008	149.4937	Collagen	-19.77	Bison	Grazers	-24.77	-29.77	-6.7	18.5289624	313.5
Fox-Dobbs et al., 2008	0.03	Alaska	USA	64.2008	149.4937	Collagen	-19.72	Rangifer	Grazers	-24.72	-29.72	-6.7	18.47674514	313.5
Fox-Dobbs et al., 2008	0.03	Alaska	USA	64.2008	149.4937	Collagen	-19.71	Symbos	N.A.	-24.71	-29.71	-6.7	18.46630233	313.5
Fox-Dobbs et al., 2008	0.03	Alaska	USA	64.2008	149.4937	Collagen	-19.45	Rangifer	Grazers	-24.45	-29.45	-6.7	18.19486444	313.5
Fox-Dobbs et al., 2008	0.03	Alaska	USA	64.2008	149.4937	Collagen	-19.43	Rangifer	Grazers	-24.43	-29.43	-6.7	18.17399059	313.5
Fox-Dobbs et al., 2008	0.03	Alaska	USA	64.2008	149.4937	Collagen	-19.31	Rangifer	Grazers	-24.31	-29.31	-6.7	18.04876549	313.5
Fox-Dobbs et al., 2008	0.03	Alaska	USA	64.2008	149.4937	Collagen	-19.27	Rangifer	Grazers	-24.27	-29.27	-6.7	18.00703063	313.5
Fox-Dobbs et al., 2008	0.03	Alaska	USA	64.2008	149.4937	Collagen	-19.21	Rangifer	Grazers	-24.21	-29.21	-6.7	17.94443477	313.5
Fox-	0.03	Alaska	USA	64.200	149.493	Collag	-	Rangifer	Grazers	-	-	-6.7	17.9235	313.5

Dobbs et al., 2008				8	7	en	19.19			24.19	29.19		7119	
Fox-Dobbs et al., 2008	0.03	Alaska	USA	64.2008	149.4937	Collagen	-18.99	Rangifer	Grazers	-23.99	-28.99	-6.7	17.71498243	313.5
Fox-Dobbs et al., 2008	0.03	Alaska	USA	64.2008	149.4937	Collagen	-17.51	Symbos	N.A.	-22.51	-27.51	-6.7	16.17407851	313.5
Bocherens et al., 2015a	0.0305	Předmostí	Europe	49.4675	17.4374	Collagen	-23.3	Mammuthus primigenius	Grazers	-28.3	-33.3	-6.69867	22.23045179	313.225
Bocherens et al., 2015a	0.0305	Předmostí	Europe	49.4675	17.4374	Collagen	-22.6	Coelodonta antiquitatis	Both	-27.6	-32.6	-6.69867	21.49458042	313.225
Bocherens et al., 2015a	0.0305	Předmostí	Europe	49.4675	17.4374	Collagen	-22.1	Coelodonta antiquitatis	Both	-27.1	-32.1	-6.69867	20.96960633	313.225
Bocherens et al., 2015a	0.0305	Předmostí	Europe	49.4675	17.4374	Collagen	-22	Gulo gulo	Grazers	-27	-32	-6.69867	20.86467626	313.225
Bocherens et al., 2015a	0.0305	Předmostí	Europe	49.4675	17.4374	Collagen	-21.8	Mammuthus primigenius	Grazers	-26.8	-31.8	-6.69867	20.65488081	313.225
Bocherens et al., 2015a	0.0305	Předmostí	Europe	49.4675	17.4374	Collagen	-21.5	Mammuthus primigenius	Grazers	-26.5	-31.5	-6.69867	20.34034926	313.225
Bocherens et al., 2015a	0.0305	Předmostí	Europe	49.4675	17.4374	Collagen	-21.3	Mammuthus primigenius	Grazers	-26.3	-31.3	-6.69867	20.13076923	313.225
Bocher	0.030	Předmostí	Europ	49.467	17.4374	Collag	-21.3	Mammuthus	Grazers	-26.3	-	-6.69867	20.1307	313.2

ens et al., 2015a	5		e	5		en		primigenius			31.3		6923	25
Bocherens et al., 2015a	0.0305	Předmostí	Europe	49.4675	17.4374	Collagen	-21.2	Mammuthus primigenius	Grazers	-26.2	-31.2	-6.69867	20.0260115	313.225
Bocherens et al., 2015a	0.0305	Předmostí	Europe	49.4675	17.4374	Collagen	-21.1	Mammuthus primigenius	Grazers	-26.1	-31.1	-6.69867	19.92127528	313.225
Bocherens et al., 2015a	0.0305	Předmostí	Europe	49.4675	17.4374	Collagen	-21	Equus ferus	Grazers	-26	-31	-6.69867	19.81656057	313.225
Bocherens et al., 2015a	0.0305	Předmostí	Europe	49.4675	17.4374	Collagen	-20.9	Cervus elaphus	Browsers	-25.9	-30.9	-6.69867	19.71186736	313.225
Bocherens et al., 2015a	0.0305	Předmostí	Europe	49.4675	17.4374	Collagen	-20.9	Mammuthus primigenius	Grazers	-25.9	-30.9	-6.69867	19.71186736	313.225
Bocherens et al., 2015a	0.0305	Předmostí	Europe	49.4675	17.4374	Collagen	-20.8	Canis lupus "wolf"	Both	-25.8	-30.8	-6.69867	19.60719565	313.225
Bocherens et al., 2015a	0.0305	Předmostí	Europe	49.4675	17.4374	Collagen	-20.8	Equus ferus	Grazers	-25.8	-30.8	-6.69867	19.60719565	313.225
Bocherens et al., 2015a	0.0305	Předmostí	Europe	49.4675	17.4374	Collagen	-20.8	Equus ferus	Grazers	-25.8	-30.8	-6.69867	19.60719565	313.225
Bocherens et al., 2015a	0.0305	Předmostí	Europe	49.4675	17.4374	Collagen	-20.7	Bovini	Grazers	-25.7	-30.7	-6.69867	19.50254542	313.225
Bocher	0.030	Předmostí	Europ	49.467	17.4374	Collag	-20.7	Equus ferus	Grazers	-25.7	-	-6.69867	19.5025	313.2

ens et al., 2015a	5		e	5		en					30.7		4542	25
Bocherens et al., 2015a	0.0305	Předmostí	Europe	49.4675	17.4374	Collagen	-20.7	Mammuthus primigenius	Grazers	-25.7	-30.7	-6.69867	19.50254542	313.225
Bocherens et al., 2015a	0.0305	Předmostí	Europe	49.4675	17.4374	Collagen	-20.5	Coelodonta antiquitatis	Both	-25.5	-30.5	-6.69867	19.29330939	313.225
Bocherens et al., 2015a	0.0305	Předmostí	Europe	49.4675	17.4374	Collagen	-20.4	Equus ferus	Grazers	-25.4	-30.4	-6.69867	19.18872358	313.225
Bocherens et al., 2015a	0.0305	Předmostí	Europe	49.4675	17.4374	Collagen	-20.3	Bovini	Grazers	-25.3	-30.3	-6.69867	19.08415923	313.225
Bocherens et al., 2015a	0.0305	Předmostí	Europe	49.4675	17.4374	Collagen	-20.3	Coelodonta antiquitatis	Both	-25.3	-30.3	-6.69867	19.08415923	313.225
Bocherens et al., 2015a	0.0305	Předmostí	Europe	49.4675	17.4374	Collagen	-20.3	Homo sapiens	N.A.	-25.3	-30.3	-6.69867	19.08415923	313.225
Bocherens et al., 2015a	0.0305	Předmostí	Europe	49.4675	17.4374	Collagen	-20.3	Ursus arctos	Grazers	-25.3	-30.3	-6.69867	19.08415923	313.225
Bocherens et al., 2015a	0.0305	Předmostí	Europe	49.4675	17.4374	Collagen	-20.2	Bovini	Grazers	-25.2	-30.2	-6.69867	18.97961633	313.225
Bocherens et al., 2015a	0.0305	Předmostí	Europe	49.4675	17.4374	Collagen	-20.1	Homo sapiens	N.A.	-25.1	-30.1	-6.69867	18.87509488	313.225
Bocher	0.030	Předmostí	Europ	49.467	17.4374	Collag	-19.8	Alopex	Grazers	-24.8	-	-6.69867	18.5616	313.2

ens et al., 2015a	5		e	5		en		lagopus			29.8		5915	25
Bocherens et al., 2015a	0.0305	Předmostí	Europe	49.4675	17.4374	Collagen	-19.8	Alopex lagopus	Grazers	-24.8	-29.8	-6.69867	18.56165915	313.225
Bocherens et al., 2015a	0.0305	Předmostí	Europe	49.4675	17.4374	Collagen	-19.8	Ursus arctos	Grazers	-24.8	-29.8	-6.69867	18.56165915	313.225
Bocherens et al., 2015a	0.0305	Předmostí	Europe	49.4675	17.4374	Collagen	-19.8	Ursus arctos	Grazers	-24.8	-29.8	-6.69867	18.56165915	313.225
Bocherens et al., 2015a	0.0305	Předmostí	Europe	49.4675	17.4374	Collagen	-19.7	Alopex lagopus	Grazers	-24.7	-29.7	-6.69867	18.45722342	313.225
Bocherens et al., 2015a	0.0305	Předmostí	Europe	49.4675	17.4374	Collagen	-19.6	Alopex lagopus	Grazers	-24.6	-29.6	-6.69867	18.3528091	313.225
Bocherens et al., 2015a	0.0305	Předmostí	Europe	49.4675	17.4374	Collagen	-19.6	Bovini	Grazers	-24.6	-29.6	-6.69867	18.3528091	313.225
Bocherens et al., 2015a	0.0305	Předmostí	Europe	49.4675	17.4374	Collagen	-19.6	Bovini	Grazers	-24.6	-29.6	-6.69867	18.3528091	313.225
Bocherens et al., 2015a	0.0305	Předmostí	Europe	49.4675	17.4374	Collagen	-19.6	Ovibos moschatus	Grazers	-24.6	-29.6	-6.69867	18.3528091	313.225
Bocherens et al., 2015a	0.0305	Předmostí	Europe	49.4675	17.4374	Collagen	-19.5	Alopex lagopus	Grazers	-24.5	-29.5	-6.69867	18.2484162	313.225
Bocher	0.030	Předmostí	Europ	49.467	17.4374	Collag	-19.5	Canis lupus	Both	-24.5	-	-6.69867	18.2484	313.2

ens et al., 2015a	5		e	5		en		"wolf"			29.5		162	25
Bocherens et al., 2015a	0.0305	Předmostí	Europe	49.4675	17.4374	Collagen	-19.5	Canis lupus "wolf"	Both	-24.5	-29.5	-6.69867	18.2484162	313.225
Bocherens et al., 2015a	0.0305	Předmostí	Europe	49.4675	17.4374	Collagen	-19.4	Canis lupus "wolf"	Both	-24.4	-29.4	-6.69867	18.14404469	313.225
Bocherens et al., 2015a	0.0305	Předmostí	Europe	49.4675	17.4374	Collagen	-19.4	Gulo gulo	Grazers	-24.4	-29.4	-6.69867	18.14404469	313.225
Bocherens et al., 2015a	0.0305	Předmostí	Europe	49.4675	17.4374	Collagen	-19.4	Homo sapiens	N.A.	-24.4	-29.4	-6.69867	18.14404469	313.225
Bocherens et al., 2015a	0.0305	Předmostí	Europe	49.4675	17.4374	Collagen	-19.3	Canis lupus "dog"	Both	-24.3	-29.3	-6.69867	18.03969458	313.225
Bocherens et al., 2015a	0.0305	Předmostí	Europe	49.4675	17.4374	Collagen	-19.3	Gulo gulo	Grazers	-24.3	-29.3	-6.69867	18.03969458	313.225
Bocherens et al., 2015a	0.0305	Předmostí	Europe	49.4675	17.4374	Collagen	-19.3	Panthera spelaea	Both	-24.3	-29.3	-6.69867	18.03969458	313.225
Bocherens et al., 2015a	0.0305	Předmostí	Europe	49.4675	17.4374	Collagen	-19.3	Rangifer tarandus	Grazers	-24.3	-29.3	-6.69867	18.03969458	313.225
Bocherens et al., 2015a	0.0305	Předmostí	Europe	49.4675	17.4374	Collagen	-19.1	Ovibos moschatus	Grazers	-24.1	-29.1	-6.69867	17.83105851	313.225
Bocher	0.030	Předmostí	Europ	49.467	17.4374	Collag	-19	Alopex	Grazers	-24	-29	-6.69867	17.7267	313.2

ens et al., 2015a	5		e	5		en		lagopus					7254	25
Bocherens et al., 2015a	0.0305	Předmostí	Europe	49.4675	17.4374	Collagen	-19	Gulo gulo	Grazers	-24	-29	-6.69867	17.72677254	313.225
Bocherens et al., 2015a	0.0305	Předmostí	Europe	49.4675	17.4374	Collagen	-18.9	Gulo gulo	Grazers	-23.9	-28.9	-6.69867	17.62250794	313.225
Bocherens et al., 2015a	0.0305	Předmostí	Europe	49.4675	17.4374	Collagen	-18.9	Rangifer tarandus	Grazers	-23.9	-28.9	-6.69867	17.62250794	313.225
Bocherens et al., 2015a	0.0305	Předmostí	Europe	49.4675	17.4374	Collagen	-18.9	Rangifer tarandus	Grazers	-23.9	-28.9	-6.69867	17.62250794	313.225
Bocherens et al., 2015a	0.0305	Předmostí	Europe	49.4675	17.4374	Collagen	-18.8	Rangifer tarandus	Grazers	-23.8	-28.8	-6.69867	17.5182647	313.225
Bocherens et al., 2015a	0.0305	Předmostí	Europe	49.4675	17.4374	Collagen	-18.7	Canis lupus "dog"	Both	-23.7	-28.7	-6.69867	17.41404281	313.225
Bocherens et al., 2015a	0.0305	Předmostí	Europe	49.4675	17.4374	Collagen	-18.7	Canis lupus "wolf"	Both	-23.7	-28.7	-6.69867	17.41404281	313.225
Bocherens et al., 2015a	0.0305	Předmostí	Europe	49.4675	17.4374	Collagen	-18.7	Ovibos moschatus	Grazers	-23.7	-28.7	-6.69867	17.41404281	313.225
Bocherens et al., 2015a	0.0305	Předmostí	Europe	49.4675	17.4374	Collagen	-18.6	Panthera spelaea	Both	-23.6	-28.6	-6.69867	17.30984228	313.225
Bocher	0.030	Předmostí	Europ	49.467	17.4374	Collag	-18.6	Panthera	Both	-23.6	-	-6.69867	17.3098	313.2

ens et al., 2015a	5		e	5		en		spelaea			28.6		4228	25
Bocherens et al., 2015a	0.0305	Předmostí	Europe	49.4675	17.4374	Collagen	-18.3	Canis lupus "dog"	Both	-23.3	-28.3	-6.69867	16.99736869	313.225
Richard et al., 2003	0.035	Belguim	Europe	50.5039	4.4699	Collagen	-20	Fauna	N.A.	-25	-30	-6.68667	18.78290256	310.75
Feranec et al., 2010	0.04	Burgos	Spain	42.344	3.6969	tooth enamel	-15.8	Ursus spelaeus	Grazers	-29.8	-34.8	-6.67333	23.83701299	308
Feranec et al., 2010	0.04	Burgos	Spain	42.344	3.6969	tooth enamel	-14.3	Ursus arctos	Grazers	-28.3	-33.3	-6.67333	22.25652979	308
Feranec et al., 2010	0.04	Burgos	Spain	42.344	3.6969	tooth enamel	-13.7	Lynx pardinus	Grazers	-28.2	-33.2	-6.67333	22.15133772	308
Feranec et al., 2010	0.04	Burgos	Spain	42.344	3.6969	tooth enamel	-13	Crocuta crocuta	Both	-27.5	-32.5	-6.67333	21.41559897	308
Feranec et al., 2010	0.04	Burgos	Spain	42.344	3.6969	tooth enamel	-12.3	Vulpes vulpes	Grazers	-26.8	-31.8	-6.67333	20.68091862	308
Feranec et al., 2010	0.04	Burgos	Spain	42.344	3.6969	tooth enamel	-12.1	Castor fiber	Browsers	-26.1	-31.1	-6.67333	19.94729438	308
Feranec et al., 2010	0.04	Burgos	Spain	42.344	3.6969	tooth enamel	-10.9	Canis lupus	Both	-25.4	-30.4	-6.67333	19.21472399	308
Feranec et al., 2010	0.04	Burgos	Spain	42.344	3.6969	tooth enamel	-10.8	Cervus elaphus	Browsers	-25.3	-30.3	-6.67333	19.11015697	308
Feranec et al., 2010	0.04	Burgos	Spain	42.344	3.6969	tooth enamel	-10.6	Equus ferus	Grazers	-24.6	-29.6	-6.67333	18.37878819	308
Feranec et al., 2010	0.04	Burgos	Spain	42.344	3.6969	tooth enamel	-10	Rupicapra rupicapra	Browsers	-24.5	-29.5	-6.67333	18.27439262	308

Feranec et al., 2010	0.04	Burgos	Spain	42.344	3.6969	tooth enamel	-10.3	Stephanorhinus	Both	-24.3	-29.3	-6.67333	18.06566568	308
Feranec et al., 2010	0.04	Burgos	Spain	42.344	3.6969	tooth enamel	-9.7	Capra pyrenaica	Both	-24.2	-29.2	-6.67333	17.96133429	308
Feranec et al., 2010	0.04	Burgos	Spain	42.344	3.6969	tooth enamel	-9.9	Equus hydruntinus	Grazers	-23.9	-28.9	-6.67333	17.64846839	308
Feranec et al., 2010	0.04	Burgos	Spain	42.344	3.6969	tooth enamel	-8.9	Bos primigenius	Grazers	-23.4	-28.4	-6.67333	17.12745239	308
Raghvan et al., 2014	0.04	Taimyr	Canada	76	105	Collagen	-21.8	Musk ox	Grazers	-26.8	-31.8	-6.67333	20.68091862	308
Raghvan et al., 2014	0.04	Taimyr	Canada	76	105	Collagen	-21.7	Musk ox	Grazers	-26.7	-31.7	-6.67333	20.57605055	308
Raghvan et al., 2014	0.04	Taimyr	Canada	76	105	Collagen	-21.7	Musk ox	Grazers	-26.7	-31.7	-6.67333	20.57605055	308
Raghvan et al., 2014	0.04	Taimyr	Canada	76	105	Collagen	-21.5	Musk ox	Grazers	-26.5	-31.5	-6.67333	20.36637904	308
Raghvan et al., 2014	0.04	Taimyr	Canada	76	105	Collagen	-21.5	Musk ox	Grazers	-26.5	-31.5	-6.67333	20.36637904	308
Raghvan et al., 2014	0.04	Taimyr	Canada	76	105	Collagen	-21.4	Musk ox	Grazers	-26.4	-31.4	-6.67333	20.2615756	308
Raghvan et al., 2014	0.04	Taimyr	Canada	76	105	Collagen	-21.4	Musk ox	Grazers	-26.4	-31.4	-6.67333	20.2615756	308
Raghvan et al., 2014	0.04	Taimyr	Canada	76	105	Collagen	-21.4	Musk ox	Grazers	-26.4	-31.4	-6.67333	20.2615756	308
Raghvan et al., 2014	0.04	Taimyr	Canada	76	105	Collagen	-21.4	Musk ox	Grazers	-26.4	-31.4	-6.67333	20.2615756	308
Raghva	0.04	Taimyr	Canan	76	105	Collag	-21.3	Musk ox	Grazers	-26.3	-	-6.67333	20.1567	308

n et al., 2014			da			en					31.3		9367	
Raghvan et al., 2014	0.04	Taimyr	Canan da	76	105	Collag en	-21.3	Musk ox	Grazers	-26.3	- 31.3	-6.67333	20.1567 9367	308
Raghvan et al., 2014	0.04	Taimyr	Canan da	76	105	Collag en	-21.3	Musk ox	Grazers	-26.3	- 31.3	-6.67333	20.1567 9367	308
Raghvan et al., 2014	0.04	Taimyr	Canan da	76	105	Collag en	-21.2	Musk ox	Grazers	-26.2	- 31.2	-6.67333	20.0520 3327	308
Raghvan et al., 2014	0.04	Taimyr	Canan da	76	105	Collag en	-21.2	Musk ox	Grazers	-26.2	- 31.2	-6.67333	20.0520 3327	308
Raghvan et al., 2014	0.04	Taimyr	Canan da	76	105	Collag en	-21.2	Musk ox	Grazers	-26.2	- 31.2	-6.67333	20.0520 3327	308
Raghvan et al., 2014	0.04	Taimyr	Canan da	76	105	Collag en	-21.2	Musk ox	Grazers	-26.2	- 31.2	-6.67333	20.0520 3327	308
Raghvan et al., 2014	0.04	Taimyr	Canan da	76	105	Collag en	-21.2	Musk ox	Grazers	-26.2	- 31.2	-6.67333	20.0520 3327	308
Raghvan et al., 2014	0.04	Taimyr	Canan da	76	105	Collag en	-21.2	Musk ox	Grazers	-26.2	- 31.2	-6.67333	20.0520 3327	308
Raghvan et al., 2014	0.04	Taimyr	Canan da	76	105	Collag en	-21.2	Musk ox	Grazers	-26.2	- 31.2	-6.67333	20.0520 3327	308
Raghvan et al., 2014	0.04	Taimyr	Canan da	76	105	Collag en	-21.1	Musk ox	Grazers	-26.1	- 31.1	-6.67333	19.9472 9438	308
Raghvan et al., 2014	0.04	Taimyr	Canan da	76	105	Collag en	-21.1	Musk ox	Grazers	-26.1	- 31.1	-6.67333	19.9472 9438	308
Raghvan et al., 2014	0.04	Taimyr	Canan da	76	105	Collag en	-21.1	Musk ox	Grazers	-26.1	- 31.1	-6.67333	19.9472 9438	308
Raghvan et al.,	0.04	Taimyr	Canan da	76	105	Collag en	-21.1	Musk ox	Grazers	-26.1	- 31.1	-6.67333	19.9472 9438	308

2014														
Raghva n et al., 2014	0.04	Taimyr	Canan da	76	105	Collag en	-21.1	Musk ox	Grazers	-26.1	- 31.1	-6.67333	19.9472 9438	308
Raghva n et al., 2014	0.04	Taimyr	Canan da	76	105	Collag en	-21.1	Musk ox	Grazers	-26.1	- 31.1	-6.67333	19.9472 9438	308
Raghva n et al., 2014	0.04	Taimyr	Canan da	76	105	Collag en	-21.1	Musk ox	Grazers	-26.1	- 31.1	-6.67333	19.9472 9438	308
Raghva n et al., 2014	0.04	Taimyr	Canan da	76	105	Collag en	-21.1	Musk ox	Grazers	-26.1	- 31.1	-6.67333	19.9472 9438	308
Raghva n et al., 2014	0.04	Taimyr	Canan da	76	105	Collag en	-21	Musk ox	Grazers	-26	-31	-6.67333	19.8425 77	308
Raghva n et al., 2014	0.04	Taimyr	Canan da	76	105	Collag en	-21	Musk ox	Grazers	-26	-31	-6.67333	19.8425 77	308
Raghva n et al., 2014	0.04	Taimyr	Canan da	76	105	Collag en	-21	Musk ox	Grazers	-26	-31	-6.67333	19.8425 77	308
Raghva n et al., 2014	0.04	Taimyr	Canan da	76	105	Collag en	-21	Musk ox	Grazers	-26	-31	-6.67333	19.8425 77	308
Raghva n et al., 2014	0.04	Taimyr	Canan da	76	105	Collag en	-21	Musk ox	Grazers	-26	-31	-6.67333	19.8425 77	308
Raghva n et al., 2014	0.04	Taimyr	Canan da	76	105	Collag en	-21	Musk ox	Grazers	-26	-31	-6.67333	19.8425 77	308
Raghva n et al., 2014	0.04	Taimyr	Canan da	76	105	Collag en	-21	Musk ox	Grazers	-26	-31	-6.67333	19.8425 77	308
Raghva n et al., 2014	0.04	Taimyr	Canan da	76	105	Collag en	-20.9	Musk ox	Grazers	-25.9	- 30.9	-6.67333	19.7378 8112	308
Raghva n et al., 2014	0.04	Taimyr	Canan da	76	105	Collag en	-20.9	Musk ox	Grazers	-25.9	- 30.9	-6.67333	19.7378 8112	308

Raghvan et al., 2014	0.04	Taimyr	Canan da	76	105	Collag en	-20.9	Musk ox	Grazers	-25.9	-30.9	-6.67333	19.7378 8112	308
Raghvan et al., 2014	0.04	Taimyr	Canan da	76	105	Collag en	-20.9	Musk ox	Grazers	-25.9	-30.9	-6.67333	19.7378 8112	308
Raghvan et al., 2014	0.04	Taimyr	Canan da	76	105	Collag en	-20.9	Musk ox	Grazers	-25.9	-30.9	-6.67333	19.7378 8112	308
Raghvan et al., 2014	0.04	Taimyr	Canan da	76	105	Collag en	-20.9	Musk ox	Grazers	-25.9	-30.9	-6.67333	19.7378 8112	308
Raghvan et al., 2014	0.04	Taimyr	Canan da	76	105	Collag en	-20.9	Musk ox	Grazers	-25.9	-30.9	-6.67333	19.7378 8112	308
Raghvan et al., 2014	0.04	Taimyr	Canan da	76	105	Collag en	-20.9	Musk ox	Grazers	-25.9	-30.9	-6.67333	19.7378 8112	308
Raghvan et al., 2014	0.04	Taimyr	Canan da	76	105	Collag en	-20.9	Musk ox	Grazers	-25.9	-30.9	-6.67333	19.7378 8112	308
Raghvan et al., 2014	0.04	Taimyr	Canan da	76	105	Collag en	-20.8	Musk ox	Grazers	-25.8	-30.8	-6.67333	19.6332 0673	308
Raghvan et al., 2014	0.04	Taimyr	Canan da	76	105	Collag en	-20.8	Musk ox	Grazers	-25.8	-30.8	-6.67333	19.6332 0673	308
Raghvan et al., 2014	0.04	Taimyr	Canan da	76	105	Collag en	-20.8	Musk ox	Grazers	-25.8	-30.8	-6.67333	19.6332 0673	308
Raghvan et al., 2014	0.04	Taimyr	Canan da	76	105	Collag en	-20.8	Musk ox	Grazers	-25.8	-30.8	-6.67333	19.6332 0673	308
Raghvan et al., 2014	0.04	Taimyr	Canan da	76	105	Collag en	-20.8	Musk ox	Grazers	-25.8	-30.8	-6.67333	19.6332 0673	308
Raghvan et al., 2014	0.04	Taimyr	Canan da	76	105	Collag en	-20.8	Musk ox	Grazers	-25.8	-30.8	-6.67333	19.6332 0673	308
Raghva	0.04	Taimyr	Canan	76	105	Collag	-20.7	Musk ox	Grazers	-25.7	-	-6.67333	19.5285	308

n et al., 2014			da			en					30.7		5383	
Raghvan et al., 2014	0.04	Taimyr	Cananda	76	105	Collagen	-20.7	Musk ox	Grazers	-25.7	-30.7	-6.67333	19.52855383	308
Raghvan et al., 2014	0.04	Taimyr	Cananda	76	105	Collagen	-20.7	Musk ox	Grazers	-25.7	-30.7	-6.67333	19.52855383	308
Raghvan et al., 2014	0.04	Taimyr	Cananda	76	105	Collagen	-20.7	Musk ox	Grazers	-25.7	-30.7	-6.67333	19.52855383	308
Raghvan et al., 2014	0.04	Taimyr	Cananda	76	105	Collagen	-20.7	Musk ox	Grazers	-25.7	-30.7	-6.67333	19.52855383	308
Raghvan et al., 2014	0.04	Taimyr	Cananda	76	105	Collagen	-20.7	Musk ox	Grazers	-25.7	-30.7	-6.67333	19.52855383	308
Raghvan et al., 2014	0.04	Taimyr	Cananda	76	105	Collagen	-20.7	Musk ox	Grazers	-25.7	-30.7	-6.67333	19.52855383	308
Raghvan et al., 2014	0.04	Taimyr	Cananda	76	105	Collagen	-20.7	Musk ox	Grazers	-25.7	-30.7	-6.67333	19.52855383	308
Raghvan et al., 2014	0.04	Taimyr	Cananda	76	105	Collagen	-20.6	Musk ox	Grazers	-25.6	-30.6	-6.67333	19.42392241	308
Raghvan et al., 2014	0.04	Taimyr	Cananda	76	105	Collagen	-20.6	Musk ox	Grazers	-25.6	-30.6	-6.67333	19.42392241	308
Raghvan et al., 2014	0.04	Taimyr	Cananda	76	105	Collagen	-20.6	Musk ox	Grazers	-25.6	-30.6	-6.67333	19.42392241	308
Raghvan et al., 2014	0.04	Taimyr	Cananda	76	105	Collagen	-20.6	Musk ox	Grazers	-25.6	-30.6	-6.67333	19.42392241	308
Raghvan et al., 2014	0.04	Taimyr	Cananda	76	105	Collagen	-20.6	Musk ox	Grazers	-25.6	-30.6	-6.67333	19.42392241	308
Raghvan et al.,	0.04	Taimyr	Cananda	76	105	Collagen	-20.6	Musk ox	Grazers	-25.6	-30.6	-6.67333	19.42392241	308

2014														
Raghvan et al., 2014	0.04	Taimyr	Canada	76	105	Collagen	-20.6	Musk ox	Grazers	-25.6	-30.6	-6.67333	19.42392241	308
Raghvan et al., 2014	0.04	Taimyr	Canada	76	105	Collagen	-20.5	Musk ox	Grazers	-25.5	-30.5	-6.67333	19.31931247	308
Raghvan et al., 2014	0.04	Taimyr	Canada	76	105	Collagen	-20.5	Musk ox	Grazers	-25.5	-30.5	-6.67333	19.31931247	308
Raghvan et al., 2014	0.04	Taimyr	Canada	76	105	Collagen	-20.5	Musk ox	Grazers	-25.5	-30.5	-6.67333	19.31931247	308
Raghvan et al., 2014	0.04	Taimyr	Canada	76	105	Collagen	-20.5	Musk ox	Grazers	-25.5	-30.5	-6.67333	19.31931247	308
Raghvan et al., 2014	0.04	Taimyr	Canada	76	105	Collagen	-20.5	Musk ox	Grazers	-25.5	-30.5	-6.67333	19.31931247	308
Raghvan et al., 2014	0.04	Taimyr	Canada	76	105	Collagen	-20.5	Musk ox	Grazers	-25.5	-30.5	-6.67333	19.31931247	308
Raghvan et al., 2014	0.04	Taimyr	Canada	76	105	Collagen	-20.4	Musk ox	Grazers	-25.4	-30.4	-6.67333	19.21472399	308
Raghvan et al., 2014	0.04	Taimyr	Canada	76	105	Collagen	-20.4	Musk ox	Grazers	-25.4	-30.4	-6.67333	19.21472399	308
Raghvan et al., 2014	0.04	Taimyr	Canada	76	105	Collagen	-20.4	Musk ox	Grazers	-25.4	-30.4	-6.67333	19.21472399	308
Raghvan et al., 2014	0.04	Taimyr	Canada	76	105	Collagen	-20.4	Musk ox	Grazers	-25.4	-30.4	-6.67333	19.21472399	308
Raghvan et al., 2014	0.04	Taimyr	Canada	76	105	Collagen	-20.4	Musk ox	Grazers	-25.4	-30.4	-6.67333	19.21472399	308
Raghvan et al., 2014	0.04	Taimyr	Canada	76	105	Collagen	-20.4	Musk ox	Grazers	-25.4	-30.4	-6.67333	19.21472399	308

Raghvan et al., 2014	0.04	Taimyr	Canan da	76	105	Collag en	-20.4	Musk ox	Grazers	-25.4	- 30.4	-6.67333	19.2147 2399	308
Raghvan et al., 2014	0.04	Taimyr	Canan da	76	105	Collag en	-20.4	Musk ox	Grazers	-25.4	- 30.4	-6.67333	19.2147 2399	308
Raghvan et al., 2014	0.04	Taimyr	Canan da	76	105	Collag en	-20.4	Musk ox	Grazers	-25.4	- 30.4	-6.67333	19.2147 2399	308
Raghvan et al., 2014	0.04	Taimyr	Canan da	76	105	Collag en	-20.3	Musk ox	Grazers	-25.3	- 30.3	-6.67333	19.1101 5697	308
Raghvan et al., 2014	0.04	Taimyr	Canan da	76	105	Collag en	-20.3	Musk ox	Grazers	-25.3	- 30.3	-6.67333	19.1101 5697	308
Raghvan et al., 2014	0.04	Taimyr	Canan da	76	105	Collag en	-20.3	Musk ox	Grazers	-25.3	- 30.3	-6.67333	19.1101 5697	308
Raghvan et al., 2014	0.04	Taimyr	Canan da	76	105	Collag en	-20.3	Musk ox	Grazers	-25.3	- 30.3	-6.67333	19.1101 5697	308
Raghvan et al., 2014	0.04	Taimyr	Canan da	76	105	Collag en	-20.3	Musk ox	Grazers	-25.3	- 30.3	-6.67333	19.1101 5697	308
Raghvan et al., 2014	0.04	Taimyr	Canan da	76	105	Collag en	-20.3	Musk ox	Grazers	-25.3	- 30.3	-6.67333	19.1101 5697	308
Raghvan et al., 2014	0.04	Taimyr	Canan da	76	105	Collag en	-20.3	Musk ox	Grazers	-25.3	- 30.3	-6.67333	19.1101 5697	308
Raghvan et al., 2014	0.04	Taimyr	Canan da	76	105	Collag en	-20.3	Musk ox	Grazers	-25.3	- 30.3	-6.67333	19.1101 5697	308
Raghvan et al., 2014	0.04	Taimyr	Canan da	76	105	Collag en	-20.3	Musk ox	Grazers	-25.3	- 30.3	-6.67333	19.1101 5697	308
Raghvan et al., 2014	0.04	Taimyr	Canan da	76	105	Collag en	-20.3	Musk ox	Grazers	-25.3	- 30.3	-6.67333	19.1101 5697	308
Raghva	0.04	Taimyr	Canan	76	105	Collag	-20.3	Musk ox	Grazers	-25.3	-	-6.67333	19.1101	308

n et al., 2014			da			en					30.3		5697	
Raghvan et al., 2014	0.04	Taimyr	Canan da	76	105	Collag en	-20.3	Musk ox	Grazers	-25.3	- 30.3	-6.67333	19.1101 5697	308
Raghvan et al., 2014	0.04	Taimyr	Canan da	76	105	Collag en	-20.2	Musk ox	Grazers	-25.2	- 30.2	-6.67333	19.0056 1141	308
Raghvan et al., 2014	0.04	Taimyr	Canan da	76	105	Collag en	-20.2	Musk ox	Grazers	-25.2	- 30.2	-6.67333	19.0056 1141	308
Raghvan et al., 2014	0.04	Taimyr	Canan da	76	105	Collag en	-20.2	Musk ox	Grazers	-25.2	- 30.2	-6.67333	19.0056 1141	308
Raghvan et al., 2014	0.04	Taimyr	Canan da	76	105	Collag en	-20.2	Musk ox	Grazers	-25.2	- 30.2	-6.67333	19.0056 1141	308
Raghvan et al., 2014	0.04	Taimyr	Canan da	76	105	Collag en	-20.2	Musk ox	Grazers	-25.2	- 30.2	-6.67333	19.0056 1141	308
Raghvan et al., 2014	0.04	Taimyr	Canan da	76	105	Collag en	-20.2	Musk ox	Grazers	-25.2	- 30.2	-6.67333	19.0056 1141	308
Raghvan et al., 2014	0.04	Taimyr	Canan da	76	105	Collag en	-20.2	Musk ox	Grazers	-25.2	- 30.2	-6.67333	19.0056 1141	308
Raghvan et al., 2014	0.04	Taimyr	Canan da	76	105	Collag en	-20.2	Musk ox	Grazers	-25.2	- 30.2	-6.67333	19.0056 1141	308
Raghvan et al., 2014	0.04	Taimyr	Canan da	76	105	Collag en	-20.1	Musk ox	Grazers	-25.1	- 30.1	-6.67333	18.9010 8729	308
Raghvan et al., 2014	0.04	Taimyr	Canan da	76	105	Collag en	-20.1	Musk ox	Grazers	-25.1	- 30.1	-6.67333	18.9010 8729	308
Raghvan et al., 2014	0.04	Taimyr	Canan da	76	105	Collag en	-20.1	Musk ox	Grazers	-25.1	- 30.1	-6.67333	18.9010 8729	308
Raghvan et al.,	0.04	Taimyr	Canan da	76	105	Collag en	-20.1	Musk ox	Grazers	-25.1	- 30.1	-6.67333	18.9010 8729	308

2014														
Raghvan et al., 2014	0.04	Taimyr	Canada	76	105	Collagen	-20	Musk ox	Grazers	-25	-30	-6.67333	18.79658462	308
Raghvan et al., 2014	0.04	Taimyr	Canada	76	105	Collagen	-20	Musk ox	Grazers	-25	-30	-6.67333	18.79658462	308
Raghvan et al., 2014	0.04	Taimyr	Canada	76	105	Collagen	-20	Musk ox	Grazers	-25	-30	-6.67333	18.79658462	308
Raghvan et al., 2014	0.04	Taimyr	Canada	76	105	Collagen	-20	Musk ox	Grazers	-25	-30	-6.67333	18.79658462	308
Raghvan et al., 2014	0.04	Taimyr	Canada	76	105	Collagen	-20	Musk ox	Grazers	-25	-30	-6.67333	18.79658462	308
Raghvan et al., 2014	0.04	Taimyr	Canada	76	105	Collagen	-20	Musk ox	Grazers	-25	-30	-6.67333	18.79658462	308
Raghvan et al., 2014	0.04	Taimyr	Canada	76	105	Collagen	-20	Musk ox	Grazers	-25	-30	-6.67333	18.79658462	308
Raghvan et al., 2014	0.04	Taimyr	Canada	76	105	Collagen	-20	Musk ox	Grazers	-25	-30	-6.67333	18.79658462	308
Raghvan et al., 2014	0.04	Taimyr	Canada	76	105	Collagen	-19.9	Musk ox	Grazers	-24.9	-29.9	-6.67333	18.69210337	308
Raghvan et al., 2014	0.04	Taimyr	Canada	76	105	Collagen	-19.9	Musk ox	Grazers	-24.9	-29.9	-6.67333	18.69210337	308
Raghvan et al., 2014	0.04	Taimyr	Canada	76	105	Collagen	-19.9	Musk ox	Grazers	-24.9	-29.9	-6.67333	18.69210337	308
Raghvan et al., 2014	0.04	Taimyr	Canada	76	105	Collagen	-19.9	Musk ox	Grazers	-24.9	-29.9	-6.67333	18.69210337	308
Raghvan et al., 2014	0.04	Taimyr	Canada	76	105	Collagen	-19.9	Musk ox	Grazers	-24.9	-29.9	-6.67333	18.69210337	308

Raghvan et al., 2014	0.04	Taimyr	Canan da	76	105	Collag en	-19.9	Musk ox	Grazers	-24.9	- 29.9	-6.67333	18.6921 0337	308
Raghvan et al., 2014	0.04	Taimyr	Canan da	76	105	Collag en	-19.9	Musk ox	Grazers	-24.9	- 29.9	-6.67333	18.6921 0337	308
Raghvan et al., 2014	0.04	Taimyr	Canan da	76	105	Collag en	-19.9	Musk ox	Grazers	-24.9	- 29.9	-6.67333	18.6921 0337	308
Raghvan et al., 2014	0.04	Taimyr	Canan da	76	105	Collag en	-19.9	Musk ox	Grazers	-24.9	- 29.9	-6.67333	18.6921 0337	308
Raghvan et al., 2014	0.04	Taimyr	Canan da	76	105	Collag en	-19.8	Musk ox	Grazers	-24.8	- 29.8	-6.67333	18.5876 4356	308
Raghvan et al., 2014	0.04	Taimyr	Canan da	76	105	Collag en	-19.8	Musk ox	Grazers	-24.8	- 29.8	-6.67333	18.5876 4356	308
Raghvan et al., 2014	0.04	Taimyr	Canan da	76	105	Collag en	-19.8	Musk ox	Grazers	-24.8	- 29.8	-6.67333	18.5876 4356	308
Raghvan et al., 2014	0.04	Taimyr	Canan da	76	105	Collag en	-19.8	Musk ox	Grazers	-24.8	- 29.8	-6.67333	18.5876 4356	308
Raghvan et al., 2014	0.04	Taimyr	Canan da	76	105	Collag en	-19.8	Musk ox	Grazers	-24.8	- 29.8	-6.67333	18.5876 4356	308
Raghvan et al., 2014	0.04	Taimyr	Canan da	76	105	Collag en	-19.8	Musk ox	Grazers	-24.8	- 29.8	-6.67333	18.5876 4356	308
Raghvan et al., 2014	0.04	Taimyr	Canan da	76	105	Collag en	-19.8	Musk ox	Grazers	-24.8	- 29.8	-6.67333	18.5876 4356	308
Raghvan et al., 2014	0.04	Taimyr	Canan da	76	105	Collag en	-19.8	Musk ox	Grazers	-24.8	- 29.8	-6.67333	18.5876 4356	308
Raghvan et al., 2014	0.04	Taimyr	Canan da	76	105	Collag en	-19.8	Musk ox	Grazers	-24.8	- 29.8	-6.67333	18.5876 4356	308
Raghva	0.04	Taimyr	Canan	76	105	Collag	-19.8	Musk ox	Grazers	-24.8	-	-6.67333	18.5876	308

n et al., 2014			da			en					29.8		4356	
Raghvan et al., 2014	0.04	Taimyr	Canan da	76	105	Collag en	-19.7	Musk ox	Grazers	-24.7	- 29.7	-6.67333	18.4832 0517	308
Raghvan et al., 2014	0.04	Taimyr	Canan da	76	105	Collag en	-19.7	Musk ox	Grazers	-24.7	- 29.7	-6.67333	18.4832 0517	308
Raghvan et al., 2014	0.04	Taimyr	Canan da	76	105	Collag en	-19.7	Musk ox	Grazers	-24.7	- 29.7	-6.67333	18.4832 0517	308
Raghvan et al., 2014	0.04	Taimyr	Canan da	76	105	Collag en	-19.7	Musk ox	Grazers	-24.7	- 29.7	-6.67333	18.4832 0517	308
Raghvan et al., 2014	0.04	Taimyr	Canan da	76	105	Collag en	-19.7	Musk ox	Grazers	-24.7	- 29.7	-6.67333	18.4832 0517	308
Raghvan et al., 2014	0.04	Taimyr	Canan da	76	105	Collag en	-19.7	Musk ox	Grazers	-24.7	- 29.7	-6.67333	18.4832 0517	308
Raghvan et al., 2014	0.04	Taimyr	Canan da	76	105	Collag en	-19.6	Musk ox	Grazers	-24.6	- 29.6	-6.67333	18.3787 8819	308
Raghvan et al., 2014	0.04	Taimyr	Canan da	76	105	Collag en	-19.6	Musk ox	Grazers	-24.6	- 29.6	-6.67333	18.3787 8819	308
Raghvan et al., 2014	0.04	Taimyr	Canan da	76	105	Collag en	-19.6	Musk ox	Grazers	-24.6	- 29.6	-6.67333	18.3787 8819	308
Raghvan et al., 2014	0.04	Taimyr	Canan da	76	105	Collag en	-19.6	Musk ox	Grazers	-24.6	- 29.6	-6.67333	18.3787 8819	308
Raghvan et al., 2014	0.04	Taimyr	Canan da	76	105	Collag en	-19.6	Musk ox	Grazers	-24.6	- 29.6	-6.67333	18.3787 8819	308
Raghvan et al., 2014	0.04	Taimyr	Canan da	76	105	Collag en	-19.5	Musk ox	Grazers	-24.5	- 29.5	-6.67333	18.2743 9262	308
Raghvan et al.,	0.04	Taimyr	Canan da	76	105	Collag en	-19.5	Musk ox	Grazers	-24.5	- 29.5	-6.67333	18.2743 9262	308

2014														
Raghvan et al., 2014	0.04	Taimyr	Canada	76	105	Collagen	-19.5	Musk ox	Grazers	-24.5	-29.5	-6.67333	18.27439262	308
Raghvan et al., 2014	0.04	Taimyr	Canada	76	105	Collagen	-19.4	Musk ox	Grazers	-24.4	-29.4	-6.67333	18.17001845	308
Raghvan et al., 2014	0.04	Taimyr	Canada	76	105	Collagen	-19.4	Musk ox	Grazers	-24.4	-29.4	-6.67333	18.17001845	308
Raghvan et al., 2014	0.04	Taimyr	Canada	76	105	Collagen	-19.4	Musk ox	Grazers	-24.4	-29.4	-6.67333	18.17001845	308
Raghvan et al., 2014	0.04	Taimyr	Canada	76	105	Collagen	-19.3	Musk ox	Grazers	-24.3	-29.3	-6.67333	18.06566568	308
Raghvan et al., 2014	0.04	Taimyr	Canada	76	105	Collagen	-19.3	Musk ox	Grazers	-24.3	-29.3	-6.67333	18.06566568	308
Raghvan et al., 2014	0.04	Taimyr	Canada	76	105	Collagen	-19.3	Musk ox	Grazers	-24.3	-29.3	-6.67333	18.06566568	308
Raghvan et al., 2014	0.04	Taimyr	Canada	76	105	Collagen	-19.3	Musk ox	Grazers	-24.3	-29.3	-6.67333	18.06566568	308
Raghvan et al., 2014	0.04	Taimyr	Canada	76	105	Collagen	-19.3	Musk ox	Grazers	-24.3	-29.3	-6.67333	18.06566568	308
Raghvan et al., 2014	0.04	Taimyr	Canada	76	105	Collagen	-19.3	Musk ox	Grazers	-24.3	-29.3	-6.67333	18.06566568	308
Raghvan et al., 2014	0.04	Taimyr	Canada	76	105	Collagen	-19.2	Musk ox	Grazers	-24.2	-29.2	-6.67333	17.96133429	308
Raghvan et al., 2014	0.04	Taimyr	Canada	76	105	Collagen	-19.1	Musk ox	Grazers	-24.1	-29.1	-6.67333	17.85702429	308
Raghvan et al., 2014	0.04	Taimyr	Canada	76	105	Collagen	-19.1	Musk ox	Grazers	-24.1	-29.1	-6.67333	17.85702429	308

Raghvan et al., 2014	0.04	Taimyr	Cananda	76	105	Collagen	-19.1	Musk ox	Grazers	-24.1	-29.1	-6.67333	17.85702429	308
Raghvan et al., 2014	0.04	Taimyr	Cananda	76	105	Collagen	-18.9	Musk ox	Grazers	-23.9	-28.9	-6.67333	17.64846839	308
Raghvan et al., 2014	0.04	Taimyr	Cananda	76	105	Collagen	-18.8	Musk ox	Grazers	-23.8	-28.8	-6.67333	17.5442225	308
Raghvan et al., 2014	0.04	Taimyr	Cananda	76	105	Collagen	-18.6	Musk ox	Grazers	-23.6	-28.6	-6.67333	17.33579476	308
Pushkina et al., 2014	0.047	Germany	Europe	51.192726	7.074455	tooth enamel	-17.2	Cervus elaphus	Browsers	-31.7	-36.7	-6.65055	25.86951358	309.4
Pushkina et al., 2014	0.047	Germany	Europe	51.192726	7.074455	tooth enamel	-17	Dama dama	Browsers	-31.5	-36.5	-6.65055	25.65766649	309.4
Pushkina et al., 2014	0.047	Germany	Europe	51.192726	7.074455	tooth enamel	-16.2	Megalaceros giganteus	Grazers	-30.7	-35.7	-6.65055	24.81115238	309.4
Pushkina et al., 2014	0.047	Germany	Europe	51.192726	7.074455	tooth enamel	-15.2	Cervus elaphus	Browsers	-29.7	-34.7	-6.65055	23.75497269	309.4
Pushkina et al., 2014	0.047	Germany	Europe	51.192726	7.074455	tooth enamel	-15.2	Dama dama	Browsers	-29.7	-34.7	-6.65055	23.75497269	309.4
Pushkina et al., 2014	0.047	Germany	Europe	51.192726	7.074455	tooth enamel	-15.07	Megalaceros giganteus	Grazers	-29.57	-34.57	-6.65055	23.61782921	309.4
Pushkina et al., 2014	0.047	Germany	Europe	51.192726	7.074455	tooth enamel	-14.9	Dama dama	Browsers	-29.4	-34.4	-6.65055	23.43854317	309.4
Pushkina et al., 2014	0.047	Germany	Europe	51.192726	7.074455	tooth enamel	-14.9	Megalaceros giganteus	Grazers	-29.4	-34.4	-6.65055	23.43854317	309.4
Pushkina et al., 2014	0.047	Germany	Europe	51.192726	7.074455	tooth enamel	-15.2	Stephanorhinus	Both	-29.2	-34.2	-6.65055	23.22769881	309.4
Pushkin	0.047	Germany	Europ	51.192	7.07445	tooth	-	Stephanorhi	Both	-	-	-6.65055	22.9958	309.4

a et al., 2014			e	726	5	enamel	14.98	nus		28.98	33.98		7032	
Pushkina et al., 2014	0.047	Germany	Europe	51.192726	7.074455	tooth enamel	-14.92	Stephanorhinus etruscus or hundsheimensis	Both	-28.92	-33.92	-6.65055	22.9326626	309.4
Pushkina et al., 2014	0.047	Germany	Europe	51.192726	7.074455	tooth enamel	-14.3	Dama dama	Browsers	-28.8	-33.8	-6.65055	22.80627059	309.4
Pushkina et al., 2014	0.047	Germany	Europe	51.192726	7.074455	tooth enamel	-14.54	Stephanorhinus etruscus or hundsheimensis	Both	-28.54	-33.54	-6.65055	22.53252836	309.4
Pushkina et al., 2014	0.047	Germany	Europe	51.192726	7.074455	tooth enamel	-14.27	Stephanorhinus etruscus or hundsheimensis	Both	-28.27	-33.27	-6.65055	22.24841262	309.4
Pushkina et al., 2014	0.047	Germany	Europe	51.192726	7.074455	tooth enamel	-14.24	Stephanorhinus kirchbergensis	Both	-28.24	-33.24	-6.65055	22.21685396	309.4
Pushkina et al., 2014	0.047	Germany	Europe	51.192726	7.074455	tooth enamel	-14.22	Stephanorhinus etruscus or hundsheimensis	Both	-28.22	-33.22	-6.65055	22.19581593	309.4
Pushkina et al., 2014	0.047	Germany	Europe	51.192726	7.074455	tooth enamel	-14.2	Equus ferus	Grazers	-28.2	-33.2	-6.65055	22.17477876	309.4
Pushkina et al., 2014	0.047	Germany	Europe	51.192726	7.074455	tooth enamel	-14.05	Stephanorhinus etruscus or hundsheimensis	Both	-28.05	-33.05	-6.65055	22.01702762	309.4
Pushkina et al., 2014	0.047	Germany	Europe	51.192726	7.074455	tooth enamel	-13.91	Equus mosbachensis	Grazers	-27.91	-32.91	-6.65055	21.86983715	309.4

Pushkina et al., 2014	0.047	Germany	Europe	51.192726	7.074455	tooth enamel	-13.85	Palaeoloxodon antiquus	Both	-27.85	-32.85	-6.65055	21.8067685	309.4
Pushkina et al., 2014	0.047	Germany	Europe	51.192726	7.074455	tooth enamel	-13.3	Cervus elaphus	Browsers	-27.8	-32.8	-6.65055	21.75421724	309.4
Pushkina et al., 2014	0.047	Germany	Europe	51.192726	7.074455	tooth enamel	-13.8	Equus sp.	Grazers	-27.8	-32.8	-6.65055	21.75421724	309.4
Pushkina et al., 2014	0.047	Germany	Europe	51.192726	7.074455	tooth enamel	-13.69	Stephanorhinus etruscus or hundsheimensis	Both	-27.69	-32.69	-6.65055	21.63862348	309.4
Pushkina et al., 2014	0.047	Germany	Europe	51.192726	7.074455	tooth enamel	-13.6	Equus ferus	Grazers	-27.6	-32.6	-6.65055	21.54406623	309.4
Pushkina et al., 2014	0.047	Germany	Europe	51.192726	7.074455	tooth enamel	-13.6	Stephanorhinus kirchbergensis	Both	-27.6	-32.6	-6.65055	21.54406623	309.4
Pushkina et al., 2014	0.047	Germany	Europe	51.192726	7.074455	tooth enamel	-13.56	Equus ferus	Grazers	-27.56	-32.56	-6.65055	21.5020464	309.4
Pushkina et al., 2014	0.047	Germany	Europe	51.192726	7.074455	tooth enamel	-13	Cervus elaphus	Browsers	-27.5	-32.5	-6.65055	21.43902314	309.4
Pushkina et al., 2014	0.047	Germany	Europe	51.192726	7.074455	tooth enamel	-13.43	Equus ferus	Grazers	-27.43	-32.43	-6.65055	21.36550582	309.4
Pushkina et al., 2014	0.047	Germany	Europe	51.192726	7.074455	tooth enamel	-12.9	Cervus elaphus	Browsers	-27.4	-32.4	-6.65055	21.33400165	309.4
Pushkina et al., 2014	0.047	Germany	Europe	51.192726	7.074455	tooth enamel	-12.84	Megalaceros giganteus	Grazers	-27.34	-32.34	-6.65055	21.27099912	309.4
Pushkina et al., 2014	0.047	Germany	Europe	51.192726	7.074455	tooth enamel	-13.33	Equus ferus	Grazers	-27.33	-32.33	-6.65055	21.26049945	309.4
Pushkin	0.047	Germany	Europ	51.192	7.07445	tooth	-	Megalaceros	Grazers	-	-	-6.65055	21.2604	309.4

a et al., 2014			e	726	5	enamel	12.83	giganteus		27.33	32.33		9945	
Pushkina et al., 2014	0.047	Germany	Europe	51.192726	7.074455	tooth enamel	-13.31	Stephanorhinus etruscus or hundsheimensis	Both	-27.31	-32.31	-6.65055	21.23950077	309.4
Pushkina et al., 2014	0.047	Germany	Europe	51.192726	7.074455	tooth enamel	-13.29	Equus ferus	Grazers	-27.29	-32.29	-6.65055	21.21850295	309.4
Pushkina et al., 2014	0.047	Germany	Europe	51.192726	7.074455	tooth enamel	-13.22	Palaeoloxodon antiquus	Both	-27.22	-32.22	-6.65055	21.14501737	309.4
Pushkina et al., 2014	0.047	Germany	Europe	51.192726	7.074455	tooth enamel	-13.22	Stephanorhinus kirchbergensis	Both	-27.22	-32.22	-6.65055	21.14501737	309.4
Pushkina et al., 2014	0.047	Germany	Europe	51.192726	7.074455	tooth enamel	-12.68	Megalaceros giganteus	Grazers	-27.18	-32.18	-6.65055	21.10303037	309.4
Pushkina et al., 2014	0.047	Germany	Europe	51.192726	7.074455	tooth enamel	-13.16	Stephanorhinus kirchbergensis	Both	-27.16	-32.16	-6.65055	21.08203816	309.4
Pushkina et al., 2014	0.047	Germany	Europe	51.192726	7.074455	tooth enamel	-13.13	Palaeoloxodon antiquus	Both	-27.13	-32.13	-6.65055	21.05055146	309.4
Pushkina et al., 2014	0.047	Germany	Europe	51.192726	7.074455	tooth enamel	-13.1	Equus mosbachensis	Grazers	-27.1	-32.1	-6.65055	21.01906671	309.4
Pushkina et al., 2014	0.047	Germany	Europe	51.192726	7.074455	tooth enamel	-13.1	Equus sp.	Grazers	-27.1	-32.1	-6.65055	21.01906671	309.4
Pushkina et al., 2014	0.047	Germany	Europe	51.192726	7.074455	tooth enamel	-13.1	Mammuthus primigenius fraasi	Grazers	-27.1	-32.1	-6.65055	21.01906671	309.4
Pushkina et al., 2014	0.047	Germany	Europe	51.192726	7.074455	tooth enamel	-13.05	Stephanorhinus kirchbergensis	Both	-27.05	-32.05	-6.65055	20.96659643	309.4

Pushkina et al., 2014	0.047	Germany	Europe	51.192726	7.074455	tooth enamel	-13.04	Mammuthus primigenius fraasi	Grazers	-27.04	-32.04	-6.65055	20.95610303	309.4
Pushkina et al., 2014	0.047	Germany	Europe	51.192726	7.074455	tooth enamel	-13.04	Stephanorhinus kirchbergensis	Both	-27.04	-32.04	-6.65055	20.95610303	309.4
Pushkina et al., 2014	0.047	Germany	Europe	51.192726	7.074455	tooth enamel	-13.03	Equus ferus	Grazers	-27.03	-32.03	-6.65055	20.94560983	309.4
Pushkina et al., 2014	0.047	Germany	Europe	51.192726	7.074455	tooth enamel	-13.03	Palaeoloxodon antiquus	Both	-27.03	-32.03	-6.65055	20.94560983	309.4
Pushkina et al., 2014	0.047	Germany	Europe	51.192726	7.074455	tooth enamel	-12.97	Mammuthus primigenius fraasi	Grazers	-26.97	-31.97	-6.65055	20.88265521	309.4
Pushkina et al., 2014	0.047	Germany	Europe	51.192726	7.074455	tooth enamel	-12.4	Cervus elaphus	Browsers	-26.9	-31.9	-6.65055	20.80921796	309.4
Pushkina et al., 2014	0.047	Germany	Europe	51.192726	7.074455	tooth enamel	-12.4	Cervus elaphus	Browsers	-26.9	-31.9	-6.65055	20.80921796	309.4
Pushkina et al., 2014	0.047	Germany	Europe	51.192726	7.074455	tooth enamel	-12.9	Stephanorhinus sp.	Both	-26.9	-31.9	-6.65055	20.80921796	309.4
Pushkina et al., 2014	0.047	Germany	Europe	51.192726	7.074455	tooth enamel	-12.89	Palaeoloxodon antiquus	Both	-26.89	-31.89	-6.65055	20.79872779	309.4
Pushkina et al., 2014	0.047	Germany	Europe	51.192726	7.074455	tooth enamel	-12.83	Equus mosbachensis	Grazers	-26.83	-31.83	-6.65055	20.73579128	309.4
Pushkina et al., 2014	0.047	Germany	Europe	51.192726	7.074455	tooth enamel	-12.8	Equus ferus	Grazers	-26.8	-31.8	-6.65055	20.70432594	309.4
Pushkina et al., 2014	0.047	Germany	Europe	51.192726	7.074455	tooth enamel	-12.75	Mammuthus primigenius fraasi	Grazers	-26.75	-31.75	-6.65055	20.651888	309.4
Pushkina et al., 2014	0.047	Germany	Europe	51.192726	7.074455	tooth enamel	-12.72	Equus mosbachensis	Grazers	-26.72	-31.72	-6.65055	20.62042783	309.4

Pushkina et al., 2014	0.047	Germany	Europe	51.192726	7.074455	tooth enamel	-12.2	Cervus elaphus	Browsers	-26.7	-31.7	-6.65055	20.59945546	309.4
Pushkina et al., 2014	0.047	Germany	Europe	51.192726	7.074455	tooth enamel	-12.7	Equus hydruntinus	Grazers	-26.7	-31.7	-6.65055	20.59945546	309.4
Pushkina et al., 2014	0.047	Germany	Europe	51.192726	7.074455	tooth enamel	-12.7	Equus sp.	Grazers	-26.7	-31.7	-6.65055	20.59945546	309.4
Pushkina et al., 2014	0.047	Germany	Europe	51.192726	7.074455	tooth enamel	-12.58	Palaeoloxodon antiquus	Both	-26.58	-31.58	-6.65055	20.47363933	309.4
Pushkina et al., 2014	0.047	Germany	Europe	51.192726	7.074455	tooth enamel	-12.56	Mammuthus primigenius fraasi	Grazers	-26.56	-31.56	-6.65055	20.45267299	309.4
Pushkina et al., 2014	0.047	Germany	Europe	51.192726	7.074455	tooth enamel	-12.53	Equus ferus	Grazers	-26.53	-31.53	-6.65055	20.4212251	309.4
Pushkina et al., 2014	0.047	Germany	Europe	51.192726	7.074455	tooth enamel	-12	Bos/Bison	Grazers	-26.5	-31.5	-6.65055	20.38977915	309.4
Pushkina et al., 2014	0.047	Germany	Europe	51.192726	7.074455	tooth enamel	-12.5	Equus sp.	Grazers	-26.5	-31.5	-6.65055	20.38977915	309.4
Pushkina et al., 2014	0.047	Germany	Europe	51.192726	7.074455	tooth enamel	-12.46	Coelodonta antiquitatis	Both	-26.46	-31.46	-6.65055	20.34785422	309.4
Pushkina et al., 2014	0.047	Germany	Europe	51.192726	7.074455	tooth enamel	-12.45	Equus ferus	Grazers	-26.45	-31.45	-6.65055	20.33737353	309.4
Pushkina et al., 2014	0.047	Germany	Europe	51.192726	7.074455	tooth enamel	-11.95	Megaloceros giganteus	Grazers	-26.45	-31.45	-6.65055	20.33737353	309.4
Pushkina et al., 2014	0.047	Germany	Europe	51.192726	7.074455	tooth enamel	-12.44	Palaeoloxodon antiquus	Both	-26.44	-31.44	-6.65055	20.32689305	309.4
Pushkina et al., 2014	0.047	Germany	Europe	51.192726	7.074455	tooth enamel	-12.38	Palaeoloxodon antiquus	Both	-26.38	-31.38	-6.65055	20.26401471	309.4
Pushkin	0.047	Germany	Europ	51.192	7.07445	tooth	-	Coelodonta	Both	-	-	-6.65055	20.1906	309.4

a et al., 2014			e	726	5	enamel	12.31	antiquitatis		26.31	31.31		6643	
Pushkina et al., 2014	0.047	Germany	Europe	51.192726	7.074455	tooth enamel	-12.3	Equus hydruntinus	Grazers	-26.3	-31.3	-6.65055	20.18018897	309.4
Pushkina et al., 2014	0.047	Germany	Europe	51.192726	7.074455	tooth enamel	-12.23	Mammuthus primigenius	Grazers	-26.23	-31.23	-6.65055	20.10685275	309.4
Pushkina et al., 2014	0.047	Germany	Europe	51.192726	7.074455	tooth enamel	-11.7	Bos/Bison	Grazers	-26.2	-31.2	-6.65055	20.07542617	309.4
Pushkina et al., 2014	0.047	Germany	Europe	51.192726	7.074455	tooth enamel	-12.2	Equus hydruntinus	Grazers	-26.2	-31.2	-6.65055	20.07542617	309.4
Pushkina et al., 2014	0.047	Germany	Europe	51.192726	7.074455	tooth enamel	-12.17	Equus caballus	Grazers	-26.17	-31.17	-6.65055	20.04400152	309.4
Pushkina et al., 2014	0.047	Germany	Europe	51.192726	7.074455	tooth enamel	-11.5	Bos/Bison	Grazers	-26	-31	-6.65055	19.86596509	309.4
Pushkina et al., 2014	0.047	Germany	Europe	51.192726	7.074455	tooth enamel	-12	Equus hydruntinus	Grazers	-26	-31	-6.65055	19.86596509	309.4
Pushkina et al., 2014	0.047	Germany	Europe	51.192726	7.074455	tooth enamel	-11.94	Equus caballus	Grazers	-25.94	-30.94	-6.65055	19.80314354	309.4
Pushkina et al., 2014	0.047	Germany	Europe	51.192726	7.074455	tooth enamel	-11.92	Coelodonta antiquitatis	Both	-25.92	-30.92	-6.65055	19.78220475	309.4
Pushkina et al., 2014	0.047	Germany	Europe	51.192726	7.074455	tooth enamel	-11.91	Coelodonta antiquitatis	Both	-25.91	-30.91	-6.65055	19.77173567	309.4
Pushkina et al., 2014	0.047	Germany	Europe	51.192726	7.074455	tooth enamel	-11.4	Bos/Bison	Grazers	-25.9	-30.9	-6.65055	19.76126681	309.4
Pushkina et al., 2014	0.047	Germany	Europe	51.192726	7.074455	tooth enamel	-11.9	Stephanorhinus	Both	-25.9	-30.9	-6.65055	19.76126681	309.4
Pushkina et al.,	0.047	Germany	Europe	51.192726	7.074455	tooth enamel	-11.8	Coelodonta antiquitatis	Both	-25.82	-30.8	-6.65055	19.67752366	309.4

2014							2				2			
Pushkina et al., 2014	0.047	Germany	Europe	51.192726	7.074455	tooth enamel	-11.3	Bos/Bison	Grazers	-25.8	-30.8	-6.65055	19.65659002	309.4
Pushkina et al., 2014	0.047	Germany	Europe	51.192726	7.074455	tooth enamel	-11.72	Equus caballus	Grazers	-25.72	-30.72	-6.65055	19.57286406	309.4
Pushkina et al., 2014	0.047	Germany	Europe	51.192726	7.074455	tooth enamel	-11.72	Mammuthus primigenius	Grazers	-25.72	-30.72	-6.65055	19.57286406	309.4
Pushkina et al., 2014	0.047	Germany	Europe	51.192726	7.074455	tooth enamel	-11.71	Coelodonta antiquitatis	Both	-25.71	-30.71	-6.65055	19.56239929	309.4
Pushkina et al., 2014	0.047	Germany	Europe	51.192726	7.074455	tooth enamel	-11.62	Coelodonta antiquitatis	Both	-25.62	-30.62	-6.65055	19.46822595	309.4
Pushkina et al., 2014	0.047	Germany	Europe	51.192726	7.074455	tooth enamel	-11.62	Coelodonta antiquitatis	Both	-25.62	-30.62	-6.65055	19.46822595	309.4
Pushkina et al., 2014	0.047	Germany	Europe	51.192726	7.074455	tooth enamel	-11.1	Bos/Bison	Grazers	-25.6	-30.6	-6.65055	19.4473009	309.4
Pushkina et al., 2014	0.047	Germany	Europe	51.192726	7.074455	tooth enamel	-11.59	Equus caballus	Grazers	-25.59	-30.59	-6.65055	19.4368387	309.4
Pushkina et al., 2014	0.047	Germany	Europe	51.192726	7.074455	tooth enamel	-11.53	Mammuthus primigenius	Grazers	-25.53	-30.53	-6.65055	19.37407001	309.4
Pushkina et al., 2014	0.047	Germany	Europe	51.192726	7.074455	tooth enamel	-11.39	Equus caballus	Grazers	-25.39	-30.39	-6.65055	19.22763977	309.4
Pushkina et al., 2014	0.047	Germany	Europe	51.192726	7.074455	tooth enamel	-11.38	Coelodonta antiquitatis	Both	-25.38	-30.38	-6.65055	19.21718208	309.4
Pushkina et al., 2014	0.047	Germany	Europe	51.192726	7.074455	tooth enamel	-11.12	Coelodonta antiquitatis	Both	-25.12	-30.12	-6.65055	18.94535738	309.4
Pushkina et al., 2014	0.047	Germany	Europe	51.192726	7.074455	tooth enamel	-10.6	Bos/Bison	Grazers	-25.1	-30.1	-6.65055	18.92445379	309.4

Pushkina et al., 2014	0.047	Germany	Europe	51.192726	7.074455	tooth enamel	-10.6	Bos/Bison	Grazers	-25.1	-30.1	-6.65055	18.92445379	309.4
Pushkina et al., 2014	0.047	Germany	Europe	51.192726	7.074455	tooth enamel	-10.99	Coelodonta antiquitatis	Both	-24.99	-29.99	-6.65055	18.80949939	309.4
Scherler et al., 2014	0.002	Switzerland	Europe	47.441527	7.096312	tooth enamel	-14.5	Bison priscus	Grazers	-29	-34	-6.641	23.02677652	271.2
Scherler et al., 2014	0.002	Switzerland	Europe	47.441527	7.096312	tooth enamel	-13.1	Equus germanicus	Grazers	-27.1	-32.1	-6.641	21.02888272	271.2
Scherler et al., 2014	0.002	Switzerland	Europe	47.441527	7.096312	tooth enamel	-12.4	Bison priscus	Grazers	-26.9	-31.9	-6.641	20.81903196	271.2
Scherler et al., 2014	0.002	Switzerland	Europe	47.441527	7.096312	tooth enamel	-12.6	Equus germanicus	Grazers	-26.6	-31.6	-6.641	20.50441751	271.2
Scherler et al., 2014	0.002	Switzerland	Europe	47.441527	7.096312	tooth enamel	-12.6	Mammuthus primigenius	Grazers	-26.6	-31.6	-6.641	20.50441751	271.2
Scherler et al., 2014	0.002	Switzerland	Europe	47.441527	7.096312	tooth enamel	-12.5	Mammuthus primigenius	Grazers	-26.5	-31.5	-6.641	20.39958911	271.2
Scherler et al., 2014	0.002	Switzerland	Europe	47.441527	7.096312	tooth enamel	-12.5	Mammuthus primigenius	Grazers	-26.5	-31.5	-6.641	20.39958911	271.2
Scherler et al., 2014	0.002	Switzerland	Europe	47.441527	7.096312	tooth enamel	-12.4	Equus germanicus	Grazers	-26.4	-31.4	-6.641	20.29478225	271.2
Scherler et al., 2014	0.002	Switzerland	Europe	47.441527	7.096312	tooth enamel	-12.4	Equus germanicus	Grazers	-26.4	-31.4	-6.641	20.29478225	271.2
Scherler et al., 2014	0.002	Switzerland	Europe	47.441527	7.096312	tooth enamel	-12.2	Mammuthus primigenius	Grazers	-26.2	-31.2	-6.641	20.08523311	271.2
Scherler et al., 2014	0.002	Switzerland	Europe	47.441527	7.096312	tooth enamel	-12	Mammuthus primigenius	Grazers	-26	-31	-6.641	19.87577002	271.2
Scherle	0.002	Switzerlan	Europ	47.441	7.09631	tooth	-12	Mammuthus	Grazers	-26	-31	-6.641	19.8757	271.2

r et al., 2014		d	e	527	2	enamel		primigenius					7002	
Scherler et al., 2014	0.002	Switzerland	Europe	47.441527	7.096312	tooth enamel	-12	Mammuthus primigenius	Grazers	-26	-31	-6.641	19.87577002	271.2
Scherler et al., 2014	0.002	Switzerland	Europe	47.441527	7.096312	tooth enamel	-11.9	Equus germanicus	Grazers	-25.9	-30.9	-6.641	19.77107073	271.2
Scherler et al., 2014	0.002	Switzerland	Europe	47.441527	7.096312	tooth enamel	-11.9	Equus germanicus	Grazers	-25.9	-30.9	-6.641	19.77107073	271.2
Scherler et al., 2014	0.002	Switzerland	Europe	47.441527	7.096312	tooth enamel	-11.8	Equus germanicus	Grazers	-25.8	-30.8	-6.641	19.66639294	271.2
Scherler et al., 2014	0.002	Switzerland	Europe	47.441527	7.096312	tooth enamel	-11.7	Equus germanicus	Grazers	-25.7	-30.7	-6.641	19.56173663	271.2
Scherler et al., 2014	0.002	Switzerland	Europe	47.441527	7.096312	tooth enamel	-11.7	Equus germanicus	Grazers	-25.7	-30.7	-6.641	19.56173663	271.2
Scherler et al., 2014	0.002	Switzerland	Europe	47.441527	7.096312	tooth enamel	-11.7	Equus germanicus	Grazers	-25.7	-30.7	-6.641	19.56173663	271.2
Scherler et al., 2014	0.002	Switzerland	Europe	47.441527	7.096312	tooth enamel	-11.7	Mammuthus primigenius	Grazers	-25.7	-30.7	-6.641	19.56173663	271.2
Scherler et al., 2014	0.002	Switzerland	Europe	47.441527	7.096312	tooth enamel	-11.7	Mammuthus primigenius	Grazers	-25.7	-30.7	-6.641	19.56173663	271.2
Scherler et al., 2014	0.002	Switzerland	Europe	47.441527	7.096312	tooth enamel	-11.6	Coelodonta antiquitatis	Both	-25.6	-30.6	-6.641	19.45710181	271.2
Scherler et al., 2014	0.002	Switzerland	Europe	47.441527	7.096312	tooth enamel	-11.6	Coelodonta antiquitatis	Both	-25.6	-30.6	-6.641	19.45710181	271.2
Scherler et al., 2014	0.002	Switzerland	Europe	47.441527	7.096312	tooth enamel	-11.6	Coelodonta antiquitatis	Both	-25.6	-30.6	-6.641	19.45710181	271.2
Scherler et al.,	0.002	Switzerland	Europe	47.441527	7.096312	tooth enamel	-11.6	Equus germanicus	Grazers	-25.6	-30.6	-6.641	19.45710181	271.2

2014														
Scherler et al., 2014	0.002	Switzerland	Europe	47.441527	7.096312	tooth enamel	-11.6	Equus germanicus	Grazers	-25.6	-30.6	-6.641	19.45710181	271.2
Scherler et al., 2014	0.002	Switzerland	Europe	47.441527	7.096312	tooth enamel	-11.6	Equus germanicus	Grazers	-25.6	-30.6	-6.641	19.45710181	271.2
Scherler et al., 2014	0.002	Switzerland	Europe	47.441527	7.096312	tooth enamel	-11.6	Mammuthus primigenius	Grazers	-25.6	-30.6	-6.641	19.45710181	271.2
Scherler et al., 2014	0.002	Switzerland	Europe	47.441527	7.096312	tooth enamel	-11	Bison priscus	Grazers	-25.5	-30.5	-6.641	19.35248846	271.2
Scherler et al., 2014	0.002	Switzerland	Europe	47.441527	7.096312	tooth enamel	-11.4	Equus germanicus	Grazers	-25.4	-30.4	-6.641	19.24789657	271.2
Scherler et al., 2014	0.002	Switzerland	Europe	47.441527	7.096312	tooth enamel	-10.8	Bison priscus	Grazers	-25.3	-30.3	-6.641	19.14332615	271.2
Scherler et al., 2014	0.002	Switzerland	Europe	47.441527	7.096312	tooth enamel	-10.8	Bison priscus	Grazers	-25.3	-30.3	-6.641	19.14332615	271.2
Scherler et al., 2014	0.002	Switzerland	Europe	47.441527	7.096312	tooth enamel	-11.3	Coelodonta antiquitatis	Both	-25.3	-30.3	-6.641	19.14332615	271.2
Scherler et al., 2014	0.002	Switzerland	Europe	47.441527	7.096312	tooth enamel	-11.3	Coelodonta antiquitatis	Both	-25.3	-30.3	-6.641	19.14332615	271.2
Scherler et al., 2014	0.002	Switzerland	Europe	47.441527	7.096312	tooth enamel	-11.3	Coelodonta antiquitatis	Both	-25.3	-30.3	-6.641	19.14332615	271.2
Scherler et al., 2014	0.002	Switzerland	Europe	47.441527	7.096312	tooth enamel	-11.3	Coelodonta antiquitatis	Both	-25.3	-30.3	-6.641	19.14332615	271.2
Scherler et al., 2014	0.002	Switzerland	Europe	47.441527	7.096312	tooth enamel	-11.3	Coelodonta antiquitatis	Both	-25.3	-30.3	-6.641	19.14332615	271.2
Scherler et al., 2014	0.002	Switzerland	Europe	47.441527	7.096312	tooth enamel	-11.1	Coelodonta antiquitatis	Both	-25.1	-30.1	-6.641	18.93424967	271.2

Scherler et al., 2014	0.002	Switzerland	Europe	47.441527	7.096312	tooth enamel	-10.5	Bison priscus	Grazers	-25	-30	-6.641	18.82974359	271.2
Scherler et al., 2014	0.002	Switzerland	Europe	47.441527	7.096312	tooth enamel	-11	Coelodonta antiquitatis	Both	-25	-30	-6.641	18.82974359	271.2
Scherler et al., 2014	0.002	Switzerland	Europe	47.441527	7.096312	tooth enamel	-11	Equus germanicus	Grazers	-25	-30	-6.641	18.82974359	271.2
Scherler et al., 2014	0.002	Switzerland	Europe	47.441527	7.096312	tooth enamel	-10.4	Bison priscus	Grazers	-24.9	-29.9	-6.641	18.72525895	271.2
Scherler et al., 2014	0.002	Switzerland	Europe	47.441527	7.096312	tooth enamel	-10.8	Coelodonta antiquitatis	Both	-24.8	-29.8	-6.641	18.62079573	271.2
Scherler et al., 2014	0.002	Switzerland	Europe	47.441527	7.096312	tooth enamel	-10.7	Equus germanicus	Grazers	-24.7	-29.7	-6.641	18.51635394	271.2
Scherler et al., 2014	0.002	Switzerland	Europe	47.441527	7.096312	tooth enamel	-10.1	Bison priscus	Grazers	-24.6	-29.6	-6.641	18.41193357	271.2
Scherler et al., 2014	0.002	Switzerland	Europe	47.441527	7.096312	tooth enamel	-9.2	Equus germanicus	Grazers	-23.2	-28.2	-6.641	16.9522932	271.2
Britton et al., 2012	0.12	Germany	Europe	51.1928	11.5356	Collagen	-22.3	Bos/Bison	Grazers	-27.3	-32.3	-6.5	21.38377712	335
Britton et al., 2012	0.12	Germany	Europe	51.1928	11.5356	Collagen	-22.1	Cervid	Browsers	-27.1	-32.1	-6.5	21.17381026	335
Britton et al., 2012	0.12	Germany	Europe	51.1928	11.5356	Collagen	-22.1	Equus	Grazers	-27.1	-32.1	-6.5	21.17381026	335
Britton et al., 2012	0.12	Germany	Europe	51.1928	11.5356	Collagen	-21.9	Equus	Grazers	-26.9	-31.9	-6.5	20.96392971	335
Britton et al., 2012	0.12	Germany	Europe	51.1928	11.5356	Collagen	-21.7	Equus	Grazers	-26.7	-31.7	-6.5	20.75413542	335
Britton	0.12	Germany	Europ	51.192	11.5356	Collag	-21.7	Equus	Grazers	-26.7	-	-6.5	20.7541	335

et al., 2012			e	8		en					31.7		3542	
Britton et al., 2012	0.12	Germany	Europe	51.1928	11.5356	Collagen	-21.6	Bos/Bison	Grazers	-26.6	-31.6	-6.5	20.6492706	335
Britton et al., 2012	0.12	Germany	Europe	51.1928	11.5356	Collagen	-21.6	Equus	Grazers	-26.6	-31.6	-6.5	20.6492706	335
Britton et al., 2012	0.12	Germany	Europe	51.1928	11.5356	Collagen	-21.4	Bos/Bison	Grazers	-26.4	-31.4	-6.5	20.43960559	335
Britton et al., 2012	0.12	Germany	Europe	51.1928	11.5356	Collagen	-21.3	Equus	Grazers	-26.3	-31.3	-6.5	20.33480538	335
Britton et al., 2012	0.12	Germany	Europe	51.1928	11.5356	Collagen	-21.1	Bos/Bison	Grazers	-26.1	-31.1	-6.5	20.12526953	335
Britton et al., 2012	0.12	Germany	Europe	51.1928	11.5356	Collagen	-21	Bos/Bison	Grazers	-26	-31	-6.5	20.02053388	335
Britton et al., 2012	0.12	Germany	Europe	51.1928	11.5356	Collagen	-21	Bos/Bison	Grazers	-26	-31	-6.5	20.02053388	335
Britton et al., 2012	0.12	Germany	Europe	51.1928	11.5356	Collagen	-20.9	Bos primigenius	Grazers	-25.9	-30.9	-6.5	19.91581973	335
Britton et al., 2012	0.12	Germany	Europe	51.1928	11.5356	Collagen	-20.9	Bos/Bison	Grazers	-25.9	-30.9	-6.5	19.91581973	335
Britton et al., 2012	0.12	Germany	Europe	51.1928	11.5356	Collagen	-20.9	Bos/Bison	Grazers	-25.9	-30.9	-6.5	19.91581973	335
Britton et al., 2012	0.12	Germany	Europe	51.1928	11.5356	Collagen	-20.8	Bos/Bison	Grazers	-25.8	-30.8	-6.5	19.81112708	335
Britton et al., 2012	0.12	Germany	Europe	51.1928	11.5356	Collagen	-20.8	Bos/Bison	Grazers	-25.8	-30.8	-6.5	19.81112708	335
Britton et al.,	0.12	Germany	Europe	51.1928	11.5356	Collagen	-20.7	Bos/Bison	Grazers	-25.7	-30.7	-6.5	19.70645592	335

2012														
Britton et al., 2012	0.12	Germany	Europe	51.1928	11.5356	Collagen	-20.7	Bos/Bison	Grazers	-25.7	-30.7	-6.5	19.70645592	335
Britton et al., 2012	0.12	Germany	Europe	51.1928	11.5356	Collagen	-20.5	Bos/Bison	Grazers	-25.5	-30.5	-6.5	19.49717804	335
Britton et al., 2012	0.12	Germany	Europe	51.1928	11.5356	Collagen	-20.5	Equus	Grazers	-25.5	-30.5	-6.5	19.49717804	335
Britton et al., 2012	0.12	Germany	Europe	51.1928	11.5356	Collagen	-20.4	Bos sp.	Grazers	-25.4	-30.4	-6.5	19.39257131	335
Ecker et al., 2013	0.175	Payre	France	44.7596	4.5624	tooth enamel	-16.5	Ursus spelaeus	Grazers	-30.5	-35.5	-6.4	24.85817432	323.1667
Ecker et al., 2013	0.175	Payre	France	44.7596	4.5624	tooth enamel	-16.1	Ursus spelaeus	Grazers	-30.1	-35.1	-6.4	24.43550882	323.1667
Ecker et al., 2013	0.175	Payre	France	44.7596	4.5624	tooth enamel	-15.7	Ursus spelaeus	Grazers	-29.7	-34.7	-6.4	24.0131918	323.1667
Ecker et al., 2013	0.175	Payre	France	44.7596	4.5624	tooth enamel	-14.6	Homo neanderthalensis	N.A.	-29.1	-34.1	-6.4	23.38036873	323.1667
Ecker et al., 2013	0.175	Payre	France	44.7596	4.5624	tooth enamel	-14.5	Ursus arctos	Grazers	-28.5	-33.5	-6.4	22.74832733	323.1667
Ecker et al., 2013	0.175	Payre	France	44.7596	4.5624	tooth enamel	-14	Stephanorhinus	Both	-28	-33	-6.4	22.22222222	323.1667
Ecker et al., 2013	0.175	Payre	France	44.7596	4.5624	tooth enamel	-13.4	Canis lupus	Both	-27.9	-32.9	-6.4	22.11706615	323.1667
Ecker et al., 2013	0.175	Payre	France	44.7596	4.5624	tooth enamel	-13.4	Stephanorhinus	Both	-27.4	-32.4	-6.4	21.59161012	323.1667
Ecker et al., 2013	0.175	Payre	France	44.7596	4.5624	tooth enamel	-13.1	Equus sp.	Grazers	-27.1	-32.1	-6.4	21.27659574	323.1667

Ecker et al., 2013	0.175	Payre	France	44.7596	4.5624	tooth enamel	-13	Stephanorhinus	Both	-27	-32	-6.4	21.17163412	323.1667
Ecker et al., 2013	0.175	Payre	France	44.7596	4.5624	tooth enamel	-12.1	Bos p./Bison p.	Grazers	-26.6	-31.6	-6.4	20.75200329	323.1667
Ecker et al., 2013	0.175	Payre	France	44.7596	4.5624	tooth enamel	-12.5	Equus sp.	Grazers	-26.5	-31.5	-6.4	20.64714946	323.1667
Ecker et al., 2013	0.175	Payre	France	44.7596	4.5624	tooth enamel	-12.4	Equus sp.	Grazers	-26.4	-31.4	-6.4	20.54231717	323.1667
Ecker et al., 2013	0.175	Payre	France	44.7596	4.5624	tooth enamel	-11.8	Bos p./Bison p.	Grazers	-26.3	-31.3	-6.4	20.43750642	323.1667
Ecker et al., 2013	0.175	Payre	France	44.7596	4.5624	tooth enamel	-11.7	Bos p./Bison p.	Grazers	-26.2	-31.2	-6.4	20.33271719	323.1667
Ecker et al., 2013	0.175	Payre	France	44.7596	4.5624	tooth enamel	-11.7	Hemitragus bonali	Browsers	-26.2	-31.2	-6.4	20.33271719	323.1667
Ecker et al., 2013	0.175	Payre	France	44.7596	4.5624	tooth enamel	-11.6	Hemitragus bonali	Browsers	-26.1	-31.1	-6.4	20.22794948	323.1667
Ecker et al., 2013	0.175	Payre	France	44.7596	4.5624	tooth enamel	-11.3	Cervus elaphus	Browsers	-25.8	-30.8	-6.4	19.91377541	323.1667
Ecker et al., 2013	0.175	Payre	France	44.7596	4.5624	tooth enamel	-11	Cervus elaphus	Browsers	-25.5	-30.5	-6.4	19.59979477	323.1667
Ecker et al., 2013	0.175	Payre	France	44.7596	4.5624	tooth enamel	-11	Cervus elaphus	Browsers	-25.5	-30.5	-6.4	19.59979477	323.1667
Ecker et al., 2013	0.175	Payre	France	44.7596	4.5624	tooth enamel	-11	Hemitragus bonali	Browsers	-25.5	-30.5	-6.4	19.59979477	323.1667
Kuitems et al., 2015	0.29	Schoningen	Germany	52.1395	10.9662	Collagen	-23.6	Stephanorhinus sp.	Both	-28.6	-33.6	-6.4	22.85361334	261.1905
Kuitem	0.29	Schoninge	Germ	52.139	10.9662	Collag	-23.2	Equus	Grazers	-28.2	-	-6.4	22.4325	261.1

s et al., 2015		n	any	5		en		mosbachensis			33.2		993	905
Kuitems et al., 2015	0.29	Schoningen	Germany	52.1395	10.9662	Collagen	-23	Cervus elaphus	Browsers	-28	-33	-6.4	22.22222222	261.1905
Kuitems et al., 2015	0.29	Schoningen	Germany	52.1395	10.9662	Collagen	-22.9	Palaeoloxodon antiquus	Both	-27.9	-32.9	-6.4	22.11706615	261.1905
Kuitems et al., 2015	0.29	Schoningen	Germany	52.1395	10.9662	Collagen	-22.9	Stephanorhinus sp.	Both	-27.9	-32.9	-6.4	22.11706615	261.1905
Kuitems et al., 2015	0.29	Schoningen	Germany	52.1395	10.9662	Collagen	-22.7	Equus mosbachensis	Grazers	-27.7	-32.7	-6.4	21.90681888	261.1905
Kuitems et al., 2015	0.29	Schoningen	Germany	52.1395	10.9662	Collagen	-22.7	Stephanorhinus sp.	Both	-27.7	-32.7	-6.4	21.90681888	261.1905
Kuitems et al., 2015	0.29	Schoningen	Germany	52.1395	10.9662	Collagen	-22.5	Palaeoloxodon antiquus	Both	-27.5	-32.5	-6.4	21.6966581	261.1905
Kuitems et al., 2015	0.29	Schoningen	Germany	52.1395	10.9662	Collagen	-22.4	Palaeoloxodon antiquus	Both	-27.4	-32.4	-6.4	21.59161012	261.1905
Kuitems et al., 2015	0.29	Schoningen	Germany	52.1395	10.9662	Collagen	-22.4	Stephanorhinus kirchbergensis	Both	-27.4	-32.4	-6.4	21.59161012	261.1905
Kuitems et al., 2015	0.29	Schoningen	Germany	52.1395	10.9662	Collagen	-22.1	Equus mosbachensis	Grazers	-27.1	-32.1	-6.4	21.27659574	261.1905
Kuitems et al., 2015	0.29	Schoningen	Germany	52.1395	10.9662	Collagen	-22.1	Stephanorhinus kirchbergensis	Both	-27.1	-32.1	-6.4	21.27659574	261.1905
Kuitems et al., 2015	0.29	Schoningen	Germany	52.1395	10.9662	Collagen	-22	Palaeoloxodon antiquus	Both	-27	-32	-6.4	21.17163412	261.1905
Kuitems et al., 2015	0.29	Schoningen	Germany	52.1395	10.9662	Collagen	-21.9	Equus mosbachensis	Grazers	-26.9	-31.9	-6.4	21.06669407	261.1905

Kuitems et al., 2015	0.29	Schoningen	Germany	52.1395	10.9662	Collagen	-21.9	Equus mosbachensis	Grazers	-26.9	-31.9	-6.4	21.06669407	261.1905
Kuitems et al., 2015	0.29	Schoningen	Germany	52.1395	10.9662	Collagen	-21.9	Palaeoloxodon antiquus	Both	-26.9	-31.9	-6.4	21.06669407	261.1905
Kuitems et al., 2015	0.29	Schoningen	Germany	52.1395	10.9662	Collagen	-21.8	Cervus elaphus	Browsers	-26.8	-31.8	-6.4	20.96177559	261.1905
Kuitems et al., 2015	0.29	Schoningen	Germany	52.1395	10.9662	Collagen	-21.8	Equus mosbachensis	Grazers	-26.8	-31.8	-6.4	20.96177559	261.1905
Kuitems et al., 2015	0.29	Schoningen	Germany	52.1395	10.9662	Collagen	-21.6	Equus mosbachensis	Grazers	-26.6	-31.6	-6.4	20.75200329	261.1905
Kuitems et al., 2015	0.29	Schoningen	Germany	52.1395	10.9662	Collagen	-21.5	Equus mosbachensis	Grazers	-26.5	-31.5	-6.4	20.64714946	261.1905
Kuitems et al., 2015	0.29	Schoningen	Germany	52.1395	10.9662	Collagen	-21.5	Megaloceros giganteus	Grazers	-26.5	-31.5	-6.4	20.64714946	261.1905
Kuitems et al., 2015	0.29	Schoningen	Germany	52.1395	10.9662	Collagen	-21.4	Equus mosbachensis	Grazers	-26.4	-31.4	-6.4	20.54231717	261.1905
Kuitems et al., 2015	0.29	Schoningen	Germany	52.1395	10.9662	Collagen	-21.4	Equus mosbachensis	Grazers	-26.4	-31.4	-6.4	20.54231717	261.1905
Kuitems et al., 2015	0.29	Schoningen	Germany	52.1395	10.9662	Collagen	-21.4	Equus mosbachensis	Grazers	-26.4	-31.4	-6.4	20.54231717	261.1905
Kuitems et al., 2015	0.29	Schoningen	Germany	52.1395	10.9662	Collagen	-21.4	Palaeoloxodon antiquus	Both	-26.4	-31.4	-6.4	20.54231717	261.1905
Kuitems et al., 2015	0.29	Schoningen	Germany	52.1395	10.9662	Collagen	-21.2	Bison sp.	Grazers	-26.2	-31.2	-6.4	20.33271719	261.1905
Kuitems et al., 2015	0.29	Schoningen	Germany	52.1395	10.9662	Collagen	-21.2	Cervus elaphus	Browsers	-26.2	-31.2	-6.4	20.33271719	261.1905
Kuitem	0.29	Schoninge	Germ	52.139	10.9662	Collag	-21.2	Equus	Grazers	-26.2	-	-6.4	20.3327	261.1

s et al., 2015		n	any	5		en		mosbachensis			31.2		1719	905
Kuitems et al., 2015	0.29	Schoningen	Germany	52.1395	10.9662	Collagen	-21.1	Bos/Bison	Grazers	-26.1	-31.1	-6.4	20.22794948	261.1905
Kuitems et al., 2015	0.29	Schoningen	Germany	52.1395	10.9662	Collagen	-21.1	Equus mosbachensis	Grazers	-26.1	-31.1	-6.4	20.22794948	261.1905
Kuitems et al., 2015	0.29	Schoningen	Germany	52.1395	10.9662	Collagen	-20.9	Bos/Bison	Grazers	-25.9	-30.9	-6.4	20.0184786	261.1905
Kuitems et al., 2015	0.29	Schoningen	Germany	52.1395	10.9662	Collagen	-20.9	Cervus elaphus	Browsers	-25.9	-30.9	-6.4	20.0184786	261.1905
Kuitems et al., 2015	0.29	Schoningen	Germany	52.1395	10.9662	Collagen	-20.9	Equus mosbachensis	Grazers	-25.9	-30.9	-6.4	20.0184786	261.1905
Kuitems et al., 2015	0.29	Schoningen	Germany	52.1395	10.9662	Collagen	-20.7	Cervus elaphus	Browsers	-25.7	-30.7	-6.4	19.80909371	261.1905
Kuitems et al., 2015	0.29	Schoningen	Germany	52.1395	10.9662	Collagen	-20.6	Bos/Bison	Grazers	-25.6	-30.6	-6.4	19.7044335	261.1905
Kuitems et al., 2015	0.29	Schoningen	Germany	52.1395	10.9662	Collagen	-20.6	Cervus elaphus	Browsers	-25.6	-30.6	-6.4	19.7044335	261.1905
Kuitems et al., 2015	0.29	Schoningen	Germany	52.1395	10.9662	Collagen	-20.6	Megaloceros giganteus	Grazers	-25.6	-30.6	-6.4	19.7044335	261.1905
Kuitems et al., 2015	0.29	Schoningen	Germany	52.1395	10.9662	Collagen	-20.5	Cervus elaphus	Browsers	-25.5	-30.5	-6.4	19.59979477	261.1905
Kuitems et al., 2015	0.29	Schoningen	Germany	52.1395	10.9662	Collagen	-20.5	Cervus elaphus	Browsers	-25.5	-30.5	-6.4	19.59979477	261.1905
Kuitems et al., 2015	0.29	Schoningen	Germany	52.1395	10.9662	Collagen	-20.5	Megaloceros giganteus	Grazers	-25.5	-30.5	-6.4	19.59979477	261.1905
Kuitems et al.,	0.29	Schoningen	Germany	52.1395	10.9662	Collagen	-20.4	Bison sp.	Grazers	-25.4	-30.4	-6.4	19.49517751	261.1905

2015														
Kuitems et al., 2015	0.29	Schoningen	Germany	52.1395	10.9662	Collagen	-20.4	Stephanorhinus sp.	Both	-25.4	-30.4	-6.4	19.49517751	261.1905
Kuitems et al., 2015	0.29	Schoningen	Germany	52.1395	10.9662	Collagen	-20.4	Stephanorhinus sp.	Both	-25.4	-30.4	-6.4	19.49517751	261.1905
Kuitems et al., 2015	0.29	Schoningen	Germany	52.1395	10.9662	Collagen	-20.2	Bos/Bison	Grazers	-25.2	-30.2	-6.4	19.28600739	261.1905
Kuitems et al., 2015	0.29	Schoningen	Germany	52.1395	10.9662	Collagen	-20.1	Cervus elaphus	Browsers	-25.1	-30.1	-6.4	19.18145451	261.1905
Kuitems et al., 2015	0.29	Schoningen	Germany	52.1395	10.9662	Collagen	-20	Equus mosbachensis	Grazers	-25	-30	-6.4	19.07692308	261.1905
Kuitems et al., 2015	0.29	Schoningen	Germany	52.1395	10.9662	Collagen	-19.8	Bos/Bison	Grazers	-24.8	-29.8	-6.4	18.86792453	261.1905
Qu et al., 2014	1.4	Chongzuo	China	22.404173	107.352798	tooth enamel	-17.14	Bibos	Grazers	-31.64	-36.64	-6.4	26.06468669	193
Qu et al., 2014	1.4	Chongzuo	China	22.404173	107.352798	tooth enamel	-16.63	Cervus	Browsers	-31.13	-36.13	-6.4	25.52458018	193
Qu et al., 2014	1.4	Chongzuo	China	22.404173	107.352798	tooth enamel	-16.34	Cervus	Browsers	-30.84	-35.84	-6.4	25.21771431	193
Qu et al., 2014	1.4	Chongzuo	China	22.404173	107.352798	tooth enamel	-16.2	Cervus	Browsers	-30.7	-35.7	-6.4	25.06963788	193
Qu et al., 2014	1.4	Chongzuo	China	22.404173	107.352798	tooth enamel	-16.64	Gigantopithecus blacki	N.A.	-30.64	-35.64	-6.4	25.00618965	193
Qu et al., 2014	1.4	Chongzuo	China	22.404173	107.352798	tooth enamel	-15.89	Bibos	Grazers	-30.39	-35.39	-6.4	24.74190654	193
Qu et al., 2014	1.4	Chongzuo	China	22.404173	107.352798	tooth enamel	-16.35	Gigantopithecus blacki	N.A.	-30.35	-35.35	-6.4	24.69963389	193

Qu et al., 2014	1.4	Chongzuo	China	22.404173	107.352798	tooth enamel	-15.83	Bibos	Grazers	-30.33	-35.33	-6.4	24.67849887	193
Qu et al., 2014	1.4	Chongzuo	China	22.404173	107.352798	tooth enamel	-15.56	Bibos	Grazers	-30.06	-35.06	-6.4	24.39326144	193
Qu et al., 2014	1.4	Chongzuo	China	22.404173	107.352798	tooth enamel	-15.7	Gigantopithecus blacki	N.A.	-29.7	-34.7	-6.4	24.0131918	193
Qu et al., 2014	1.4	Chongzuo	China	22.404173	107.352798	tooth enamel	-15.62	Rhinoceros	Browsers	-29.62	-34.62	-6.4	23.92877017	193
Qu et al., 2014	1.4	Chongzuo	China	22.404173	107.352798	tooth enamel	-15.07	Bibos	Grazers	-29.57	-34.57	-6.4	23.87601373	193
Qu et al., 2014	1.4	Chongzuo	China	22.404173	107.352798	tooth enamel	-15.51	Gigantopithecus blacki	N.A.	-29.51	-34.51	-6.4	23.81271317	193
Qu et al., 2014	1.4	Chongzuo	China	22.404173	107.352798	tooth enamel	-15.37	Gigantopithecus blacki	N.A.	-29.37	-34.37	-6.4	23.66504229	193
Qu et al., 2014	1.4	Chongzuo	China	22.404173	107.352798	tooth enamel	-15.34	Pongo(Orangutan)	Browsers	-29.34	-34.34	-6.4	23.63340408	193
Qu et al., 2014	1.4	Chongzuo	China	22.404173	107.352798	tooth enamel	-15.27	Gigantopithecus blacki	N.A.	-29.27	-34.27	-6.4	23.55958918	193
Qu et al., 2014	1.4	Chongzuo	China	22.404173	107.352798	tooth enamel	-14.75	Cervus	Browsers	-29.25	-34.25	-6.4	23.53850116	193
Qu et al., 2014	1.4	Chongzuo	China	22.404173	107.352798	tooth enamel	-15.23	Gigantopithecus blacki	N.A.	-29.23	-34.23	-6.4	23.51741401	193
Qu et al., 2014	1.4	Chongzuo	China	22.404173	107.352798	tooth enamel	-14.71	Cervus	Browsers	-29.21	-34.21	-6.4	23.49632773	193
Qu et al., 2014	1.4	Chongzuo	China	22.404173	107.352798	tooth enamel	-15.17	Rhinoceros	Browsers	-29.17	-34.17	-6.4	23.45415778	193
Qu et	1.4	Chongzuo	China	22.404	107.352	tooth	-	Gigantopithe	N.A.	-	-	-6.4	23.3382	193

al., 2014				173	798	enamel	15.06	cus blacki		29.06	34.06		0833	
Qu et al., 2014	1.4	Chongzuo	China	22.404173	107.352798	tooth enamel	-14.96	Pongo	Browsers	-28.96	-33.96	-6.4	23.23282254	193
Qu et al., 2014	1.4	Chongzuo	China	22.404173	107.352798	tooth enamel	-14.66	Pongo	Browsers	-28.66	-33.66	-6.4	22.91679535	193
Qu et al., 2014	1.4	Chongzuo	China	22.404173	107.352798	tooth enamel	-14.37	Gigantopithecus blacki	N.A.	-28.37	-33.37	-6.4	22.61148791	193
Qu et al., 2014	1.4	Chongzuo	China	22.404173	107.352798	tooth enamel	-14.37	Pongo	Browsers	-28.37	-33.37	-6.4	22.61148791	193
DeSantis et al., 2009	1.8	Tennessee	USA	36.3321	82.5186	tooth enamel	-13.2	Tayassuidae	Browsers	-27.7	-32.7	-6.3	22.0096678	250
DeSantis et al., 2009	1.8	Tennessee	USA	36.3321	82.5186	tooth enamel	-13.7	Teleoceras	Browsers	-27.7	-32.7	-6.3	22.0096678	250
DeSantis et al., 2009	1.8	Tennessee	USA	36.3321	82.5186	tooth enamel	-13.7	Teleoceras	Browsers	-27.7	-32.7	-6.3	22.0096678	250
DeSantis et al., 2009	1.8	Tennessee	USA	36.3321	82.5186	tooth enamel	-13.5	Teleoceras	Browsers	-27.5	-32.5	-6.3	21.79948586	250
DeSantis et al., 2009	1.8	Tennessee	USA	36.3321	82.5186	tooth enamel	-13.5	Teleoceras	Browsers	-27.5	-32.5	-6.3	21.79948586	250
DeSantis et al., 2009	1.8	Tennessee	USA	36.3321	82.5186	tooth enamel	-13.5	Teleoceras	Browsers	-27.5	-32.5	-6.3	21.79948586	250
DeSantis et al., 2009	1.8	Tennessee	USA	36.3321	82.5186	tooth enamel	-13.4	Tapirus polkensis	Browsers	-27.4	-32.4	-6.3	21.69442731	250
DeSantis et al., 2009	1.8	Tennessee	USA	36.3321	82.5186	tooth enamel	-13.4	Tapirus polkensis	Browsers	-27.4	-32.4	-6.3	21.69442731	250
DeSantis et al.,	1.8	Tennessee	USA	36.3321	82.5186	tooth enamel	-13.4	Teleoceras	Browsers	-27.4	-32.4	-6.3	21.69442731	250

2009														
DeSantis et al., 2009	1.8	Tennessee	USA	36.3321	82.5186	tooth enamel	-13.4	Teleoceras	Browsers	-27.4	-32.4	-6.3	21.69442731	250
DeSantis et al., 2009	1.8	Tennessee	USA	36.3321	82.5186	tooth enamel	-13.4	Teleoceras	Browsers	-27.4	-32.4	-6.3	21.69442731	250
DeSantis et al., 2009	1.8	Tennessee	USA	36.3321	82.5186	tooth enamel	-13.3	Tapirus polkensis	Browsers	-27.3	-32.3	-6.3	21.58939036	250
DeSantis et al., 2009	1.8	Tennessee	USA	36.3321	82.5186	tooth enamel	-12.8	Tayassuidae	Browsers	-27.3	-32.3	-6.3	21.58939036	250
DeSantis et al., 2009	1.8	Tennessee	USA	36.3321	82.5186	tooth enamel	-12.8	Tayassuidae	Browsers	-27.3	-32.3	-6.3	21.58939036	250
DeSantis et al., 2009	1.8	Tennessee	USA	36.3321	82.5186	tooth enamel	-13.3	Teleoceras	Browsers	-27.3	-32.3	-6.3	21.58939036	250
DeSantis et al., 2009	1.8	Tennessee	USA	36.3321	82.5186	tooth enamel	-13.3	Teleoceras	Browsers	-27.3	-32.3	-6.3	21.58939036	250
DeSantis et al., 2009	1.8	Tennessee	USA	36.3321	82.5186	tooth enamel	-13.3	Teleoceras	Browsers	-27.3	-32.3	-6.3	21.58939036	250
DeSantis et al., 2009	1.8	Tennessee	USA	36.3321	82.5186	tooth enamel	-13.3	Teleoceras	Browsers	-27.3	-32.3	-6.3	21.58939036	250
DeSantis et al., 2009	1.8	Tennessee	USA	36.3321	82.5186	tooth enamel	-13.3	Teleoceras	Browsers	-27.3	-32.3	-6.3	21.58939036	250
DeSantis et al., 2009	1.8	Tennessee	USA	36.3321	82.5186	tooth enamel	-13.2	Teleoceras	Browsers	-27.2	-32.2	-6.3	21.484375	250
DeSantis et al., 2009	1.8	Tennessee	USA	36.3321	82.5186	tooth enamel	-13.2	Teleoceras	Browsers	-27.2	-32.2	-6.3	21.484375	250
DeSantis et al., 2009	1.8	Tennessee	USA	36.3321	82.5186	tooth enamel	-13.2	Teleoceras	Browsers	-27.2	-32.2	-6.3	21.484375	250

DeSantis et al., 2009	1.8	Tennessee	USA	36.3321	82.5186	tooth enamel	-13.2	Teleoceras	Browsers	-27.2	-32.2	-6.3	21.484375	250
DeSantis et al., 2009	1.8	Tennessee	USA	36.3321	82.5186	tooth enamel	-13.2	Teleoceras	Browsers	-27.2	-32.2	-6.3	21.484375	250
DeSantis et al., 2009	1.8	Tennessee	USA	36.3321	82.5186	tooth enamel	-13.2	Teleoceras	Browsers	-27.2	-32.2	-6.3	21.484375	250
DeSantis et al., 2009	1.8	Tennessee	USA	36.3321	82.5186	tooth enamel	-13.2	Teleoceras	Browsers	-27.2	-32.2	-6.3	21.484375	250
DeSantis et al., 2009	1.8	Tennessee	USA	36.3321	82.5186	tooth enamel	-12.6	Tayassuidae	Browsers	-27.1	-32.1	-6.3	21.37938123	250
DeSantis et al., 2009	1.8	Tennessee	USA	36.3321	82.5186	tooth enamel	-13.1	Teleoceras	Browsers	-27.1	-32.1	-6.3	21.37938123	250
DeSantis et al., 2009	1.8	Tennessee	USA	36.3321	82.5186	tooth enamel	-13.1	Teleoceras	Browsers	-27.1	-32.1	-6.3	21.37938123	250
DeSantis et al., 2009	1.8	Tennessee	USA	36.3321	82.5186	tooth enamel	-13.1	Teleoceras	Browsers	-27.1	-32.1	-6.3	21.37938123	250
DeSantis et al., 2009	1.8	Tennessee	USA	36.3321	82.5186	tooth enamel	-13	Teleoceras	Browsers	-27	-32	-6.3	21.27440904	250
DeSantis et al., 2009	1.8	Tennessee	USA	36.3321	82.5186	tooth enamel	-12.9	Tapirus polkensis	Browsers	-26.9	-31.9	-6.3	21.16945843	250
DeSantis et al., 2009	1.8	Tennessee	USA	36.3321	82.5186	tooth enamel	-12.9	Tapirus polkensis	Browsers	-26.9	-31.9	-6.3	21.16945843	250
DeSantis et al., 2009	1.8	Tennessee	USA	36.3321	82.5186	tooth enamel	-12.8	Teleoceras	Browsers	-26.8	-31.8	-6.3	21.06452939	250
DeSantis et al., 2009	1.8	Tennessee	USA	36.3321	82.5186	tooth enamel	-12.7	Tapirus polkensis	Browsers	-26.7	-31.7	-6.3	20.9596219	250
DeSanti	1.8	Tennessee	USA	36.332	82.5186	tooth	-12.7	Teleoceras	Browsers	-26.7	-	-6.3	20.9596	250

s et al., 2009				1		enamel					31.7		219	
DeSantis et al., 2009	1.8	Tennessee	USA	36.3321	82.5186	tooth enamel	-12.6	Tapirus polkensis	Browsers	-26.6	-31.6	-6.3	20.85473598	250
DeSantis et al., 2009	1.8	Tennessee	USA	36.3321	82.5186	tooth enamel	-12.3	Tapirus polkensis	Browsers	-26.3	-31.3	-6.3	20.54020746	250
DeSantis et al., 2009	1.8	Tennessee	USA	36.3321	82.5186	tooth enamel	-11.9	Tapirus polkensis	Browsers	-25.9	-30.9	-6.3	20.12113746	250
DeSantis et al., 2009	1.8	Tennessee	USA	36.3321	82.5186	tooth enamel	-11.8	Tapirus polkensis	Browsers	-25.8	-30.8	-6.3	20.01642373	250
DeSantis et al., 2009	1.8	Tennessee	USA	36.3321	82.5186	tooth enamel	-11.7	Tapirus polkensis	Browsers	-25.7	-30.7	-6.3	19.9117315	250
DeSantis et al., 2009	1.8	Tennessee	USA	36.3321	82.5186	tooth enamel	-11	Tapirus polkensis	Browsers	-25	-30	-6.3	19.17948718	250
DeSantis et al., 2009	1.8	Tennessee	USA	36.3321	82.5186	tooth enamel	-10.9	Tapirus polkensis	Browsers	-24.9	-29.9	-6.3	19.07496667	250
DeSantis et al., 2009	1.8	Tennessee	USA	36.3321	82.5186	tooth enamel	-10.6	Tapirus polkensis	Browsers	-24.6	-29.6	-6.3	18.76153373	250
Domingo et al., 2015	0.01155	Spain	Europe	43.3619	5.8494	tooth enamel	-14.8	Vulpes vulpes	Grazers	-29.3	-34.3	-6.515	23.47275162	296.03
Domingo et al., 2015	0.01385	Spain	Europe	43.3619	5.8494	tooth enamel	-14	Vulpes vulpes	Grazers	-28.5	-33.5	-6.515	22.62995368	302.01
Domingo et al., 2015	0.01675	Spain	Europe	43.3619	5.8494	tooth enamel	-13.6	Vulpes vulpes	Grazers	-28.1	-33.1	-6.515	22.20907501	309.55
Domingo et al., 2015	0.01385	Spain	Europe	43.3619	5.8494	tooth enamel	-13.4	Canis lupus	Both	-27.9	-32.9	-6.515	21.99876556	302.01
Domingo et al.,	0.019	Spain	Europe	43.3619	5.8494	tooth enamel	-13.4	Capreolus capreolus	Browsers	-27.9	-32.9	-6.515	21.99876556	315.4

2015														
Domingo et al., 2015	0.01385	Spain	Europe	43.3619	5.8494	tooth enamel	-13.9	Ursus arctos	Grazers	-27.9	-32.9	-6.515	21.99876556	302.01
Domingo et al., 2015	0.019	Spain	Europe	43.3619	5.8494	tooth enamel	-13.4	Vulpes vulpes	Grazers	-27.9	-32.9	-6.515	21.99876556	315.4
Domingo et al., 2015	0.01675	Spain	Europe	43.3619	5.8494	tooth enamel	-12.8	Canis lupus	Both	-27.3	-32.3	-6.515	21.36835612	309.55
Domingo et al., 2015	0.019	Spain	Europe	43.3619	5.8494	tooth enamel	-12.8	Canis lupus	Both	-27.3	-32.3	-6.515	21.36835612	315.4
Domingo et al., 2015	0.019	Spain	Europe	43.3619	5.8494	tooth enamel	-11.1	Cervus elaphus	Browsers	-25.6	-30.6	-6.515	19.58641215	315.4
Domingo et al., 2015	0.019	Spain	Europe	43.3619	5.8494	tooth enamel	-11.6	Equus ferus	Grazers	-25.6	-30.6	-6.515	19.58641215	315.4
Domingo et al., 2015	0.01675	Spain	Europe	43.3619	5.8494	tooth enamel	-10.7	Cervus elaphus	Browsers	-25.2	-30.2	-6.515	19.16803447	309.55
Domingo et al., 2015	0.01675	Spain	Europe	43.3619	5.8494	tooth enamel	-10.6	Capra sp.	Grazers	-25.1	-30.1	-6.515	19.06349369	309.55
Domingo et al., 2015	0.01675	Spain	Europe	43.3619	5.8494	tooth enamel	-11.1	Equus ferus	Grazers	-25.1	-30.1	-6.515	19.06349369	309.55
Domingo et al., 2015	0.01385	Spain	Europe	43.3619	5.8494	tooth enamel	-10.5	Bos/Bison	Grazers	-25	-30	-6.515	18.95897436	302.01
Domingo et al., 2015	0.01385	Spain	Europe	43.3619	5.8494	tooth enamel	-10.4	Capra sp.	Grazers	-24.9	-29.9	-6.515	18.85447646	302.01
Domingo et al., 2015	0.019	Spain	Europe	43.3619	5.8494	tooth enamel	-10.3	Bos/Bison	Grazers	-24.8	-29.8	-6.515	18.75	315.4
Domingo et al., 2015	0.019	Spain	Europe	43.3619	5.8494	tooth enamel	-10.3	Capra sp.	Grazers	-24.8	-29.8	-6.515	18.75	315.4

Domingo et al., 2015	0.01385	Spain	Europe	43.3619	5.8494	tooth enamel	-10.3	Cervus elaphus	Browsers	-24.8	-29.8	-6.515	18.75	302.01
Domingo et al., 2015	0.01675	Spain	Europe	43.3619	5.8494	tooth enamel	-10.2	Rupicapra rupicapra	Browsers	-24.7	-29.7	-6.515	18.64554496	309.55
Domingo et al., 2015	0.01385	Spain	Europe	43.3619	5.8494	tooth enamel	-10.5	Equus ferus	Grazers	-24.5	-29.5	-6.515	18.43669913	302.01
Domingo et al., 2015	0.01155	Spain	Europe	43.3619	5.8494	tooth enamel	-9.7	Rupicapra rupicapra	Browsers	-24.2	-29.2	-6.515	18.1235909	296.03
Domingo et al., 2015	0.01675	Spain	Europe	43.3619	5.8494	tooth enamel	-9.1	Bos/Bison	Grazers	-23.6	-28.6	-6.515	17.49795166	309.55
Gil et al., 2016	0.0007	Chile	South America	-35.18	-70.05	Collagen	-20.14	Lama guanicoe	Browsers	-25.14	-30.14	-6.515	19.10530743	267.82
Gil et al., 2016	0.0015	Chile	South America	-36.93	-69.82	Collagen	-19.94	Lama guanicoe	Browsers	-24.94	-29.94	-6.515	18.89627305	269.9
Gil et al., 2016	0.0016	Chile	South America	-36.93	-69.82	Collagen	-19.94	Lama guanicoe	Browsers	-24.94	-29.94	-6.515	18.89627305	270.16
Gil et al., 2016	0.001	Chile	South America	-36.08	-69.72	Collagen	-19.89	Lama guanicoe	Browsers	-24.89	-29.89	-6.515	18.84402785	268.6
Gil et al., 2016	0.0007	Chile	South America	-36.1	-69.69	Collagen	-19.85	Lama guanicoe	Browsers	-24.85	-29.85	-6.515	18.80223555	267.82
Gil et al., 2016	0.0015	Chile	South America	-36.93	-69.82	Collagen	-19.8	Lama guanicoe	Browsers	-24.8	-29.8	-6.515	18.75	269.9
Gil et al., 2016	0.0015	Chile	South America	-36.08	-69.72	Collagen	-19.75	Lama guanicoe	Browsers	-24.75	-29.75	-6.515	18.6977698	269.9
Gil et al., 2016	0.0015	Chile	South America	-36.08	-69.72	Collagen	-19.75	Lama guanicoe	Browsers	-24.75	-29.75	-6.515	18.6977698	269.9
Gil et	0.000	Chile	South	-36.08	-69.72	Collag	-	Lama	Browsers	-	-	-6.515	18.6351	266.5

al., 2016	2		America			en	19.69	guanicoe		24.69	29.69		0063	2
Gil et al., 2016	0.0093	Chile	South America	-36.93	-69.82	Collagen	-19.49	Lama guanicoe	Browsers	-24.49	-29.49	-6.515	18.42625908	290.18
Gil et al., 2016	0.0005	Chile	South America	-35.15	-69.64	Collagen	-19.45	Lama guanicoe	Browsers	-24.45	-29.45	-6.515	18.38450105	267.3
Gil et al., 2016	0.005	Chile	South America	-35.18	-70.05	Collagen	-19.45	Lama guanicoe	Browsers	-24.45	-29.45	-6.515	18.38450105	279
Gil et al., 2016	0.00225	Chile	South America	-31.68	-69.72	Collagen	-19.36	Lama sp.	Browsers	-24.36	-29.36	-6.515	18.29055799	271.85
Gil et al., 2016	0.001	Chile	South America	-36.52	-68.53	Collagen	-19.3	Lama guanicoe	Browsers	-24.3	-29.3	-6.515	18.22793892	268.6
Gil et al., 2016	0.0002	Chile	South America	-34.6	-70.09	Collagen	-19.28	Lama guanicoe	Browsers	-24.28	-29.28	-6.515	18.2070676	266.52
Gil et al., 2016	0.0014	Chile	South America	-32.62	-69.15	Collagen	-19.25	Lama sp.	Browsers	-24.25	-29.25	-6.515	18.17576223	269.64
Gil et al., 2016	0.0013	Chile	South America	-35.18	-70.05	Collagen	-19.18	Lama guanicoe	Browsers	-24.18	-29.18	-6.515	18.10272386	269.38
Gil et al., 2016	0.0002	Chile	South America	-34.6	-70.09	Collagen	-19.17	Lama guanicoe	Browsers	-24.17	-29.17	-6.515	18.09229067	266.52
Gil et al., 2016	0.0013	Chile	South America	-32.62	-69.15	Collagen	-19.15	Lama sp.	Browsers	-24.15	-29.15	-6.515	18.07142491	269.38
Gil et al., 2016	0.0002	Chile	South America	-36.08	-69.72	Collagen	-19.15	Lama guanicoe	Browsers	-24.15	-29.15	-6.515	18.07142491	266.52
Gil et al., 2016	0.002	Chile	South America	-34.83	-69.9	Collagen	-19.09	Lama guanicoe	Browsers	-24.09	-29.09	-6.515	18.00883278	271.2
Gil et al.,	0.0004	Chile	South Ameri	-32.62	-69.15	Collagen	-18.9	Lama sp.	Browsers	-23.91	-28.9	-6.515	17.82110256	267.04

2016			ca				1				1			
Gil et al., 2016	0.0013	Chile	South America	-32.62	-69.15	Collagen	-18.9	Lama guanicoe	Browsers	-23.9	-28.9	-6.515	17.81067514	269.38
Gil et al., 2016	0.002	Chile	South America	-34.83	-69.9	Collagen	-18.9	Lama guanicoe	Browsers	-23.9	-28.9	-6.515	17.81067514	271.2
Gil et al., 2016	0.0004	Chile	South America	-32.62	-69.15	Collagen	-18.87	Lama sp.	Browsers	-23.87	-28.87	-6.515	17.77939414	267.04
Gil et al., 2016	0.0015	Chile	South America	-32.97	-69.17	Collagen	-18.85	Lama sp.	Browsers	-23.85	-28.85	-6.515	17.75854121	269.9
Gil et al., 2016	0.0013	Chile	South America	-32.62	-69.15	Collagen	-18.73	Lama sp.	Browsers	-23.73	-28.73	-6.515	17.63344157	269.38
Gil et al., 2016	0.0005	Chile	South America	-35.15	-69.64	Collagen	-18.7	Lama guanicoe	Browsers	-23.7	-28.7	-6.515	17.60217146	267.3
Gil et al., 2016	0.001	Chile	South America	-36.08	-69.72	Collagen	-18.7	Lama guanicoe	Browsers	-23.7	-28.7	-6.515	17.60217146	268.6
Gil et al., 2016	0.0002	Chile	South America	-32.88	-68.88	Collagen	-18.63	Lama sp.	Browsers	-23.63	-28.63	-6.515	17.52921536	266.52
Gil et al., 2016	0.0014	Chile	South America	-36.1	-69.69	Collagen	-18.62	Lama guanicoe	Browsers	-23.62	-28.62	-6.515	17.51879391	269.64
Gil et al., 2016	0.0003	Chile	South America	-35.37	-68.3	Collagen	-18.5	Lama sp.	Browsers	-23.5	-28.5	-6.515	17.3937532	266.78
Gil et al., 2016	0.0049	Chile	South America	-29.33	-70	Collagen	-18.48	Lama sp.	Browsers	-23.48	-28.48	-6.515	17.37291607	278.74
Gil et al., 2016	0.0015	Chile	South America	-32.97	-69.17	Collagen	-18.48	Lama sp.	Browsers	-23.48	-28.48	-6.515	17.37291607	269.9
Gil et al., 2016	0.0002	Chile	South America	-32.88	-68.88	Collagen	-18.44	Lama sp.	Browsers	-23.44	-28.44	-6.515	17.33124437	266.52

Gil et al., 2016	0.0015	Chile	South America	-32.97	-69.17	Collagen	-18.35	Lama sp.	Browsers	-23.35	-28.35	-6.515	17.23749552	269.9
Gil et al., 2016	0.0013	Chile	South America	-32.62	-69.15	Collagen	-18.31	Lama sp.	Browsers	-23.31	-28.31	-6.515	17.19583491	269.38
Gil et al., 2016	0.0004	Chile	South America	-32.62	-69.15	Collagen	-18.3	Lama guanicoe	Browsers	-23.3	-28.3	-6.515	17.18542029	267.04
Gil et al., 2016	0.0012	Chile	South America	-32.62	-69.15	Collagen	-18.19	Lama sp.	Browsers	-23.19	-28.19	-6.515	17.07087356	269.12
Gil et al., 2016	0.0093	Chile	South America	-36.93	-69.82	Collagen	-18.17	Lama guanicoe	Browsers	-23.17	-28.17	-6.515	17.05004965	290.18
Gil et al., 2016	0.0017	Chile	South America	-30.03	-69.17	Collagen	-17.99	Lama sp.	Browsers	-22.99	-27.99	-6.515	16.86267285	270.42
Gil et al., 2016	0.0015	Chile	South America	-36.93	-69.82	Collagen	-17.98	Lama guanicoe	Browsers	-22.98	-27.98	-6.515	16.85226505	269.9
Gil et al., 2016	0.0015	Chile	South America	-32.97	-69.17	Collagen	-17.96	Lama sp.	Browsers	-22.96	-27.96	-6.515	16.83145009	269.9
Gil et al., 2016	0.00225	Chile	South America	-31.72	-69.12	Collagen	-17.89	Lama sp.	Browsers	-22.89	-27.89	-6.515	16.75860446	271.85
Gil et al., 2016	0.0023	Chile	South America	-29.33	-70	Collagen	-17.71	Lama sp.	Browsers	-22.71	-27.71	-6.515	16.57133502	271.98
Gil et al., 2016	0.00135	Chile	South America	-32.62	-69.15	Collagen	-17.7	Lama sp.	Browsers	-22.7	-27.7	-6.515	16.56093318	269.51
Gil et al., 2016	0.0019	Chile	South America	-29.33	-70	Collagen	-17.55	Lama sp.	Browsers	-22.55	-27.55	-6.6347	16.28246969	270.94
Gil et al., 2016	0.0045	Chile	South America	-29.33	-70	Collagen	-17.55	Lama sp.	Browsers	-22.55	-27.55	-6.515	16.4049312	277.7
Gil et	0.009	Chile	South	-32.62	-69.15	Collag	-	Lama sp.	Browsers	-	-	-6.515	16.3321	290.7

al., 2016	5		America			en	17.48			22.48	27.48		4666	
Gil et al., 2016	0.0015	Chile	South America	-32.97	-69.17	Collagen	-17.47	Lama sp.	Browsers	-22.47	-27.47	-6.515	16.32174972	269.9
Gil et al., 2016	0.0003	Chile	South America	-35.37	-68.3	Collagen	-17.47	Lama guanicoe	Browsers	-22.47	-27.47	-6.515	16.32174972	266.78
Gil et al., 2016	0.0017	Chile	South America	-30.03	-69.17	Collagen	-17.43	Lama sp.	Browsers	-22.43	-27.43	-6.515	16.28016408	270.42
Gil et al., 2016	0.0017	Chile	South America	-30.03	-69.17	Collagen	-17.39	Lama sp.	Browsers	-22.39	-27.39	-6.515	16.23858185	270.42
Gil et al., 2016	0.0019	Chile	South America	-29.33	-70	Collagen	-17.32	Vicugna vicugna	Browsers	-22.32	-27.32	-6.6347	16.04338843	270.94
Gil et al., 2016	0.0037	Chile	South America	-29.33	-70	Collagen	-17.14	Vicugna vicugna	Browsers	-22.14	-27.14	-6.515	15.97876997	275.62
Gil et al., 2016	0.0095	Chile	South America	-32.62	-69.15	Collagen	-17	Lama sp.	Browsers	-22	-27	-6.515	15.83333333	290.7
Gil et al., 2016	0.0095	Chile	South America	-32.62	-69.15	Collagen	-16.61	Lama sp.	Browsers	-21.61	-26.61	-6.515	15.42840789	290.7
Gil et al., 2016	0.0017	Chile	South America	-30.03	-69.17	Collagen	-16.27	Lama sp.	Browsers	-21.27	-26.27	-6.515	15.07565927	270.42
Gil et al., 2016	0.0017	Chile	South America	-30.03	-69.17	Collagen	-16.26	Lama sp.	Browsers	-21.26	-26.26	-6.515	15.06528802	270.42
Gil et al., 2016	0.0017	Chile	South America	-30.03	-69.17	Collagen	-15.53	Lama sp.	Browsers	-20.53	-25.53	-6.515	14.30875882	270.42
Gil et al., 2016	0.0017	Chile	South America	-30.03	-69.17	Collagen	-15.31	Lama sp.	Browsers	-20.31	-25.31	-6.515	14.0809848	270.42
Gil et al.,	0.0017	Chile	South Ameri	-30.03	-69.17	Collagen	-14.9	Lama sp.	Browsers	-19.98	-24.9	-6.515	13.73951552	270.42

2016			ca				8				8			
Gil et al., 2016	0.0003	Chile	South America	-35.37	-68.3	Collagen	-14.7	Lama sp.	Browsers	-19.7	-24.7	-6.515	13.4499643	266.78
Gil et al., 2016	0.0017	Chile	South America	-30.03	-69.17	Collagen	-14.56	Lama sp.	Browsers	-19.56	-24.56	-6.515	13.3052507	270.42
Gil et al., 2016	0.0015	Chile	South America	-32.97	-69.17	Collagen	-14.48	Lama sp.	Browsers	-19.48	-24.48	-6.515	13.22257578	269.9
Gil et al., 2016	0.00105	Chile	South America	-30.29	-69.26	Collagen	-14.07	Lama sp.	Browsers	-19.07	-24.07	-6.515	12.79907843	268.73
Gil et al., 2016	0.0014	Chile	South America	-32.62	-69.15	Collagen	-14.04	Lama sp.	Browsers	-19.04	-24.04	-6.515	12.76810471	269.64
Stevens et al., 2004	0.003045	UK	Europe	52.3555	1.1743	Collagen	-23.3	Horse	Grazers	-28.3	-33.3	-6.706835	22.22204899	273.917
Stevens et al., 2004	0.002185	UK	Europe	52.3555	1.1743	Collagen	-23.3	Horse	Grazers	-28.3	-33.3	-6.652655	22.27780694	271.681
Stevens et al., 2004	0.00636	Belgium	Europe	50.5039	4.4699	Collagen	-23.3	Horse	Grazers	-28.3	-33.3	-6.825466667	22.09996227	282.536
Stevens et al., 2004	0.00033	UK	Europe	52.3555	1.1743	Collagen	-22.7	Horse	Grazers	-27.7	-32.7	-6.53579	21.76716034	266.858
Stevens et al., 2004	0.00111	UK	Europe	52.3555	1.1743	Collagen	-22.7	Horse	Grazers	-27.7	-32.7	-6.58493	21.71662038	268.886
Stevens et al., 2004	0.002365	UK	Europe	52.3555	1.1743	Collagen	-22.5	Horse	Grazers	-27.5	-32.5	-6.663995	21.42519794	272.149
Stevens et al., 2004	0.00155	UK	Europe	52.3555	1.1743	Collagen	-22.4	Horse	Grazers	-27.4	-32.4	-6.61265	21.37296936	270.03
Stevens et al., 2004	0.00797	Belgium	Europe	50.5039	4.4699	Collagen	-22.4	Horse	Grazers	-27.4	-32.4	-6.8201	21.1596751	286.722

Stevens et al., 2004	0.001722	UK	Europe	52.3555	1.1743	Collagen	-22.3	Horse	Grazers	-27.3	-32.3	-6.623486	21.25682533	270.4772
Stevens et al., 2004	0.001389	UK	Europe	52.3555	1.1743	Collagen	-22.2	Horse	Grazers	-27.2	-32.2	-6.602507	21.17340975	269.6114
Stevens et al., 2004	0.001416	UK	Europe	52.3555	1.1743	Collagen	-22.1	Horse	Grazers	-27.1	-32.1	-6.604208	21.06669956	269.6816
Stevens et al., 2004	0.001493	UK	Europe	52.3555	1.1743	Collagen	-22.1	Horse	Grazers	-27.1	-32.1	-6.609059	21.06171343	269.8818
Stevens et al., 2004	0.00198	UK	Europe	52.3555	1.1743	Collagen	-22	Horse	Grazers	-27	-32	-6.63974	20.92524152	271.148
Stevens et al., 2004	0.01022	UK	Europe	52.3555	1.1743	Collagen	-21.9	Horse	Grazers	-26.9	-31.9	-6.807890909	20.64752758	292.572
Stevens et al., 2004	0.002235	UK	Europe	52.3555	1.1743	Collagen	-21.8	Horse	Grazers	-26.8	-31.8	-6.655805	20.69892622	271.811
Stevens et al., 2004	0.00017	UK	Europe	52.3555	1.1743	Collagen	-21.8	Horse	Grazers	-26.8	-31.8	-6.52571	20.83260378	266.442
Stevens et al., 2004	0.00174	UK	Europe	52.3555	1.1743	Collagen	-21.8	Horse	Grazers	-26.8	-31.8	-6.62462	20.73097	270.524
Stevens et al., 2004	0.00209	UK	Europe	52.3555	1.1743	Collagen	-21.7	Horse	Grazers	-26.7	-31.7	-6.64667	20.6034419	271.434
Stevens et al., 2004	0.001434	UK	Europe	52.3555	1.1743	Collagen	-21.6	Horse	Grazers	-26.6	-31.6	-6.605342	20.54104993	269.7284
Stevens et al., 2004	0.00146	UK	Europe	52.3555	1.1743	Collagen	-21.6	Horse	Grazers	-26.6	-31.6	-6.60698	20.53936717	269.796
Stevens et al., 2004	0.001739	UK	Europe	52.3555	1.1743	Collagen	-21.6	Horse	Grazers	-26.6	-31.6	-6.624557	20.52130984	270.5214
Stevens	0.010	Germany	Europ	51.165	10.4515	Collag	-21.6	Horse	Grazers	-26.6	-	-	20.3319	292.1

et al., 2004	04		e	7		en					31.6	6.808872727	5734	04
Stevens et al., 2004	0.01081	UK	Europe	52.3555	1.1743	Collagen	-21.5	Horse	Grazers	-26.5	-31.5	-6.804672727	20.23146099	294.106
Stevens et al., 2004	0.01092	UK	Europe	52.3555	1.1743	Collagen	-21.5	Horse	Grazers	-26.5	-31.5	-6.804072727	20.23207732	294.392
Stevens et al., 2004	0.01046	UK	Europe	52.3555	1.1743	Collagen	-21.5	Horse	Grazers	-26.5	-31.5	-6.806581818	20.22949993	293.196
Stevens et al., 2004	0.001387	UK	Europe	52.3555	1.1743	Collagen	-21.5	Horse	Grazers	-26.5	-31.5	-6.602381	20.43925937	269.6062
Stevens et al., 2004	0.02715	Germany	Europe	51.1657	10.4515	Collagen	-21.5	Horse	Grazers	-26.5	-31.5	-6.715545455	20.32301443	314.7825
Stevens et al., 2004	0.000259	UK	Europe	52.3555	1.1743	Collagen	-21.4	Horse	Grazers	-26.4	-31.4	-6.531317	20.4074394	266.6734
Stevens et al., 2004	0.02358	UK	Europe	52.3555	1.1743	Collagen	-21.4	Horse	Grazers	-26.4	-31.4	-6.735018182	20.19821469	316.389
Stevens et al., 2004	0.00041	UK	Europe	52.3555	1.1743	Collagen	-21.4	Horse	Grazers	-26.4	-31.4	-6.54083	20.39766845	267.066
Stevens et al., 2004	0.01038	Germany	Europe	51.1657	10.4515	Collagen	-21.4	Horse	Grazers	-26.4	-31.4	-6.807018182	20.12426234	292.988
Stevens et al., 2004	0.01029	UK	Europe	52.3555	1.1743	Collagen	-21.3	Horse	Grazers	-26.3	-31.3	-6.807509091	20.01899036	292.754
Stevens et al., 2004	0.010125	UK	Europe	52.3555	1.1743	Collagen	-21.3	Horse	Grazers	-26.3	-31.3	-6.808409091	20.01806605	292.325
Stevens et al., 2004	0.013185	Germany	Europe	51.1657	10.4515	Collagen	-21.3	Horse	Grazers	-26.3	-31.3	-6.791718182	20.03520778	300.281
Stevens et al.,	0.0135	Germany	Europe	51.1657	10.4515	Collagen	-21.3	Horse	Grazers	-26.3	-31.3	-6.79	20.03697237	301.1

2004														
Stevens et al., 2004	0.02216	Belgium	Europe	50.5039	4.4699	Collagen	-21.3	Horse	Grazers	-26.3	-31.3	-6.742763636	20.08548461	317.028
Stevens et al., 2004	0.02594	UK	Europe	52.3555	1.1743	Collagen	-21.2	Horse	Grazers	-26.2	-31.2	-6.722145455	20.00190444	315.327
Stevens et al., 2004	0.01098	UK	Europe	52.3555	1.1743	Collagen	-21.1	Horse	Grazers	-26.1	-31.1	-6.803745455	19.81338386	294.548
Stevens et al., 2004	0.01279	Belgium	Europe	50.5039	4.4699	Collagen	-21.1	Horse	Grazers	-26.1	-31.1	-6.793872727	19.82352118	299.254
Stevens et al., 2004	0.01204	UK	Europe	52.3555	1.1743	Collagen	-21	Horse	Grazers	-26	-31	-6.797963636	19.71461639	297.304
Stevens et al., 2004	0.01327	Germany	Europe	51.1657	10.4515	Collagen	-21	Horse	Grazers	-26	-31	-6.791254545	19.72150457	300.502
Stevens et al., 2004	0.01107	UK	Europe	52.3555	1.1743	Collagen	-20.9	Horse	Grazers	-25.9	-30.9	-6.803254545	19.60450206	294.782
Stevens et al., 2004	0.01297	Germany	Europe	51.1657	10.4515	Collagen	-20.9	Horse	Grazers	-25.9	-30.9	-6.792890909	19.61514125	299.722
Stevens et al., 2004	0.01245	Germany	Europe	51.1657	10.4515	Collagen	-20.9	Horse	Grazers	-25.9	-30.9	-6.795727273	19.61222947	298.37
Stevens et al., 2004	0.03665	Belgium	Europe	50.5039	4.4699	Collagen	-20.9	Horse	Grazers	-25.9	-30.9	-6.682266667	19.72870684	309.8425
Stevens et al., 2004	0.01009	UK	Europe	52.3555	1.1743	Collagen	-20.8	Horse	Grazers	-25.8	-30.8	-6.8086	19.49435434	292.234
Stevens et al., 2004	0.01015	UK	Europe	52.3555	1.1743	Collagen	-20.8	Horse	Grazers	-25.8	-30.8	-6.808272727	19.49469028	292.39
Stevens et al., 2004	0.01271	UK	Europe	52.3555	1.1743	Collagen	-20.8	Horse	Grazers	-25.8	-30.8	-6.794309091	19.50902372	299.046

Stevens et al., 2004	0.009815	France	Europe	46.2276	2.2137	Collagen	-20.8	Horse	Grazers	-25.8	-30.8	-6.8101	19.49281462	291.519
Stevens et al., 2004	0.01209	France	Europe	46.2276	2.2137	Collagen	-20.8	Horse	Grazers	-25.8	-30.8	-6.797690909	19.50555234	297.434
Stevens et al., 2004	0.01192	UK	Europe	52.3555	1.1743	Collagen	-20.7	Horse	Grazers	-25.7	-30.7	-6.798618182	19.39996081	296.992
Stevens et al., 2004	0.0118	UK	Europe	52.3555	1.1743	Collagen	-20.7	Horse	Grazers	-25.7	-30.7	-6.799272727	19.399289	296.68
Stevens et al., 2004	0.02764	UK	Europe	52.3555	1.1743	Collagen	-20.7	Horse	Grazers	-25.7	-30.7	-6.712872727	19.48796805	314.562
Stevens et al., 2004	0.012	UK	Europe	52.3555	1.1743	Collagen	-20.7	Horse	Grazers	-25.7	-30.7	-6.798181818	19.40040869	297.2
Stevens et al., 2004	0.01223	UK	Europe	52.3555	1.1743	Collagen	-20.7	Horse	Grazers	-25.7	-30.7	-6.796927273	19.40169632	297.798
Stevens et al., 2004	0.01234	UK	Europe	52.3555	1.1743	Collagen	-20.7	Horse	Grazers	-25.7	-30.7	-6.796327273	19.40231215	298.084
Stevens et al., 2004	0.02805	Germany	Europe	51.1657	10.4515	Collagen	-20.7	Horse	Grazers	-25.7	-30.7	-6.710636364	19.49026341	314.3775
Stevens et al., 2004	0.0128	Belgium	Europe	50.5039	4.4699	Collagen	-20.7	Horse	Grazers	-25.7	-30.7	-6.793818182	19.40488743	299.28
Stevens et al., 2004	0.01332	UK	Europe	52.3555	1.1743	Collagen	-20.6	Horse	Grazers	-25.6	-30.6	-6.790981818	19.30317958	300.632
Stevens et al., 2004	0.01228	UK	Europe	52.3555	1.1743	Collagen	-20.6	Horse	Grazers	-25.6	-30.6	-6.796654545	19.29735781	297.928
Stevens et al., 2004	0.01197	UK	Europe	52.3555	1.1743	Collagen	-20.6	Horse	Grazers	-25.6	-30.6	-6.798345455	19.29562248	297.122
Stevens	0.012	UK	Europ	52.355	1.1743	Collag	-20.6	Horse	Grazers	-25.6	-	-	19.2969	297.7

et al., 2004	21		e	5		en					30.6	6.797036364	6597	46
Stevens et al., 2004	0.010715	UK	Europe	52.3555	1.1743	Collagen	-20.6	Horse	Grazers	-25.6	-30.6	-6.805190909	19.28859718	293.859
Stevens et al., 2004	0.02763	UK	Europe	52.3555	1.1743	Collagen	-20.6	Horse	Grazers	-25.6	-30.6	-6.712927273	19.38328482	314.5665
Stevens et al., 2004	0.013105	Germany	Europe	51.1657	10.4515	Collagen	-20.6	Horse	Grazers	-25.6	-30.6	-6.792154545	19.30197604	300.073
Stevens et al., 2004	0.0332	Germany	Europe	51.1657	10.4515	Collagen	-20.6	Horse	Grazers	-25.6	-30.6	-6.691466667	19.40530925	311.74
Stevens et al., 2004	0.03095	Germany	Europe	51.1657	10.4515	Collagen	-20.6	Horse	Grazers	-25.6	-30.6	-6.697466667	19.39915161	312.9775
Stevens et al., 2004	0.01266	Germany	Europe	51.1657	10.4515	Collagen	-20.6	Horse	Grazers	-25.6	-30.6	-6.794581818	19.299485	298.916
Stevens et al., 2004	0.01932	Germany	Europe	51.1657	10.4515	Collagen	-20.6	Horse	Grazers	-25.6	-30.6	-6.758254545	19.33676668	316.232
Stevens et al., 2004	0.0118	UK	Europe	52.3555	1.1743	Collagen	-20.5	Horse	Grazers	-25.5	-30.5	-6.799272727	19.19007416	296.68
Stevens et al., 2004	0.03305	UK	Europe	52.3555	1.1743	Collagen	-20.5	Horse	Grazers	-25.5	-30.5	-6.691866667	19.30029075	311.8225
Stevens et al., 2004	0.01203	UK	Europe	52.3555	1.1743	Collagen	-20.5	Horse	Grazers	-25.5	-30.5	-6.798018182	19.19136154	297.278
Stevens et al., 2004	0.00037	UK	Europe	52.3555	1.1743	Collagen	-20.5	Horse	Grazers	-25.5	-30.5	-6.53831	19.45786557	266.962
Stevens et al., 2004	0.01214	France	Europe	46.2276	2.2137	Collagen	-20.5	Horse	Grazers	-25.5	-30.5	-6.797418182	19.19197724	297.564
Stevens et al.,	0.02774	Belgium	Europe	50.5039	4.4699	Collagen	-20.5	Horse	Grazers	-25.5	-30.5	-6.71232	19.27929474	314.517

2004												7273		
Stevens et al., 2004	0.01224	UK	Europe	52.3555	1.1743	Collagen	-20.4	Horse	Grazers	-25.4	-30.4	-6.796872727	19.08796149	297.824
Stevens et al., 2004	0.01215	UK	Europe	52.3555	1.1743	Collagen	-20.4	Horse	Grazers	-25.4	-30.4	-6.797363636	19.08745779	297.59
Stevens et al., 2004	0.01163	UK	Europe	52.3555	1.1743	Collagen	-20.3	Horse	Grazers	-25.3	-30.3	-6.8002	18.97999384	296.238
Stevens et al., 2004	0.00916	UK	Europe	52.3555	1.1743	Collagen	-20.3	Horse	Grazers	-25.3	-30.3	-6.813672727	18.96617141	289.816
Stevens et al., 2004	0.01204	Germany	Europe	51.1657	10.4515	Collagen	-20.3	Horse	Grazers	-25.3	-30.3	-6.797963636	18.98228826	297.304
Stevens et al., 2004	0.01263	Germany	Europe	51.1657	10.4515	Collagen	-20.3	Horse	Grazers	-25.3	-30.3	-6.794745455	18.98558997	298.838
Stevens et al., 2004	0.0384	France	Europe	46.2276	2.2137	Collagen	-20.3	Horse	Grazers	-25.3	-30.3	-6.6776	19.10577614	308.88
Stevens et al., 2004	0.0128	Belgium	Europe	50.5039	4.4699	Collagen	-20.3	Horse	Grazers	-25.3	-30.3	-6.793818182	18.98654131	299.28
Stevens et al., 2004	0.01015	UK	Europe	52.3555	1.1743	Collagen	-20.2	Horse	Grazers	-25.2	-30.2	-6.808272727	18.86718021	292.39
Stevens et al., 2004	0.02748	Germany	Europe	51.1657	10.4515	Collagen	-20.1	Horse	Grazers	-25.1	-30.1	-6.713745455	18.85963129	314.634
Stevens et al., 2004	0.01225	UK	Europe	52.3555	1.1743	Collagen	-20	Horse	Grazers	-25	-30	-6.796818182	18.66993007	297.85
Stevens et al., 2004	0.0275	Germany	Europe	51.1657	10.4515	Collagen	-20	Horse	Grazers	-25	-30	-6.713636364	18.75524476	314.625
Stevens et al., 2004	0.00032	UK	Europe	52.3555	1.1743	Collagen	-19.9	Horse	Grazers	-24.9	-29.9	-6.53516	18.83380166	266.832

Stevens et al., 2004	0.01319	Germany	Europe	51.1657	10.4515	Collagen	-19.9	Horse	Grazers	-24.9	-29.9	-6.791690909	18.57072002	300.294
Stevens et al., 2004	0.01352	Germany	Europe	51.1657	10.4515	Collagen	-19.7	Horse	Grazers	-24.7	-29.7	-6.789890909	18.36369229	301.152
Stevens et al., 2004	0.03445	France	Europe	46.2276	2.2137	Collagen	-19.7	Horse	Grazers	-24.7	-29.7	-6.688133333	18.46802693	311.0525
Stevens et al., 2004	0.01217	UK	Europe	52.3555	1.1743	Collagen	-19.6	Horse	Grazers	-24.6	-29.6	-6.797254545	18.25173821	297.642
Stevens et al., 2004	0.01315	Germany	Europe	51.1657	10.4515	Collagen	-19.5	Horse	Grazers	-24.5	-29.5	-6.791909091	18.15283538	300.19
Stevens et al., 2004	0.0383	France	Europe	46.2276	2.2137	Collagen	-19.5	Horse	Grazers	-24.5	-29.5	-6.677866667	18.26974201	308.935
Stevens et al., 2004	0.01313	Germany	Europe	51.1657	10.4515	Collagen	-19.4	Horse	Grazers	-24.4	-29.4	-6.792018182	18.04836185	300.138
Stevens et al., 2004	0.03175	Germany	Europe	51.1657	10.4515	Collagen	-19.3	Horse	Grazers	-24.3	-29.3	-6.695333333	18.04311435	312.5375
Stevens et al., 2004	0.0329	Germany	Europe	51.1657	10.4515	Collagen	-19.3	Horse	Grazers	-24.3	-29.3	-6.692266667	18.04625739	311.905
Stevens et al., 2004	0.0301	Germany	Europe	51.1657	10.4515	Collagen	-19	Horse	Grazers	-24	-29	-6.699733333	17.72568306	313.445
Stevens et al., 2004	0.0334	France	Europe	46.2276	2.2137	Collagen	-18.8	Horse	Grazers	-23.8	-28.8	-6.690933333	17.52618999	311.63

REFERENCES

Ale, R., Zhang, L., Li, X., Raskoti, B. B., Pugnaire, F. I., & Luo, T. (2018). Leaf δ13C as an indicator of water availability along elevation gradients in the dry Himalayas. *Ecological Indicators, 94*, 266-273. doi:10.1016/j.ecolind.2018.07.002

Arens, N. C., Jahren, A. H., & Amundson, R. J. P. (2000). Can C3 plants faithfully record the carbon isotopic composition of atmospheric carbon dioxide? *, 26*(1), 137-164.

Basu, S., Ghosh, S., & Sanyal, P. (2019). Spatial heterogeneity in the relationship between precipitation and carbon isotopic discrimination of C3 plants: Inferences from a global compilation. Global and Planetary Change.

Beerling, D. J., & Royer, D. L. J. N. G. (2011). Convergent cenozoic CO 2 history. *4*(7), 418.

Beerling, D. J., Fox, A., & Anderson, C. W. (2009). Quantitative uncertainty analyses of ancient atmospheric CO2 estimates from fossil leaves. American Journal of Science, 309(9), 775-787.

Breecker, D. O. (2013). Quantifying and understanding the uncertainty of atmospheric CO2 concentrations determined from calcic paleosols. Geochemistry, Geophysics, Geosystems, 14(8), 3210-3220.

Castaños, J., Zuluaga, M. C., Ortega, L. Á., Murelaga, X., Alonso-Olazabal, A., Rofes, J., & Castaños, P. (2014). Carbon and nitrogen stable isotopes of bone collagen of large herbivores from the Late Pleistocene Kiputz IX cave site (Gipuzkoa, north Iberian Peninsula) for palaeoenvironmental reconstruction. *Quaternary International, 339-340*, 131-138. doi:10.1016/j.quaint.2013.10.006

Cerling, T. E., & Harris, J. M. (1999). Carbon isotope fractionation between diet and bioapatite in ungulate mammals and implications for ecological and paleoecological studies. Oecologia, 120(3), 347-363.

Coltrain, J. B., Harris, J. M., Cerling, T. E., Ehleringer, J. R., Dearing, M.-D., Ward, J., & Allen, J. (2004). Rancho La Brea stable isotope biogeochemistry and its implications for the palaeoecology of late Pleistocene, coastal southern California. *Palaeogeography, Palaeoclimatology, Palaeoecology, 205*(3-4), 199-219. doi:10.1016/j.palaeo.2003.12.008

Cotton, J. M., & Sheldon, N. D. (2012). New constraints on using paleosols to reconstruct atmospheric p CO2. Bulletin, 124(9-10), 1411-1423.

Cui, Y., & Schubert, B. A. (2016). Quantifying uncertainty of past pCO2 determined from changes in C3 plant carbon isotope fractionation. *Geochimica et Cosmochimica Acta*, *172*, 127-13

Cui, Y., & Schubert, B. A. (2017). Atmospheric pCO2 reconstructed across five early Eocene global warming events. Earth and Planetary Science Letters, 478, 225-233.

Cui, Y., & Schubert, B. A. (2018). Towards determination of the source and magnitude of atmospheric pCO2 change across the early Paleogene hyperthermals. Global and planetary change, 170, 120-125.

Dal Corso, J., Schmidt, A. R., Seyfullah, L. J., Preto, N., Ragazzi, E., Jenkyns, H. C., ... & Roghi, G. (2017). Evaluating the use of amber in palaeoatmospheric reconstructions: The carbon-isotope variability of modern and Cretaceous conifer resins. Geochimica et Cosmochimica Acta, 199, 351-369.

Diefendorf, A. F., & Freimuth, E. J. (2017). Extracting the most from terrestrial plant-derived n-alkyl lipids and their carbon isotopes from the sedimentary record: A review. Organic Geochemistry, 103, 1-21.

Diefendorf, A. F., Mueller, K. E., Wing, S. L., Koch, P. L., & Freeman, K. H. (2010). Global patterns in leaf 13C discrimination and implications for studies of past and future climate. *Proc Natl Acad Sci U S A, 107*(13), 5738-5743. doi:10.1073/pnas.0910513107

Dockrill, P. (2019, May 13). It's Official: Atmospheric CO2 Just Exceeded 415 ppm For The First Time in Human History. *ScienceAlert.* Retrieved from https://www.sciencealert.com/it-s-official-atmospheric-co2-just-exceeded-415-ppm-for-first-time-in-human-history/

Farquhar, G. D., Ehleringer, J. R., & Hubick, K. T. J. A. r. o. p. b. (1989). Carbon isotope discrimination and photosynthesis. *40*(1), 503-537.

Farquhar, G. D., & Sharkey, T. D. J. A. r. o. p. p. (1982). Stomatal conductance and photosynthesis. *33*(1), 317-345.

Foster, G. L., Royer, D. L., & Lunt, D. J. (2017). Future climate forcing potentially without precedent in the last 420 million years. *Nat Commun, 8*, 14845. doi:10.1038/ncomms14845

Fox-Dobbs, K., Leonard, J. A., & Koch, P. L. (2008). Pleistocene megafauna from eastern Beringia: Paleoecological and paleoenvironmental interpretations of stable carbon and nitrogen isotope and radiocarbon records. Palaeogeography, Palaeoclimatology, Palaeoecology, 261(1-2), 30-46.

Franks, P. J., & Beerling, D. J. (2009). CO2-forced evolution of plant gas exchange capacity and water-use efficiency over the Phanerozoic. Geobiology, 7(2), 227-236.

Froehle, A. W., Kellner, C. M., & Schoeninger, M. J. (2010). FOCUS: effect of diet and protein source on carbon stable isotope ratios in collagen: follow up to. Journal of Archaeological Science, 37(10), 2662-2670.

Hadley, W. (2018). ggplot2: Create Elegant Data Visualisations Using the Grammar of Graphics.

Hansen, J., Sato, M., Russell, G., & Kharecha, P. (2013). Climate sensitivity, sea level and atmospheric carbon dioxide. *Philosophical Transactions of the Royal Society A: Mathematical, Physical and Engineering Sciences*, *371*(2001), 20120294.

Hare, V. J., Loftus, E., Jeffrey, A., & Ramsey, C. B. J. N. c. (2018). Atmospheric CO 2 effect on stable carbon isotope composition of terrestrial fossil archives. *9*(1), 252.

Henke, L. M., Lambert, F. H., & Charman, D. J. (2017). Was the Little Ice Age more or less El Niño-like than the Medieval Climate Anomaly? Evidence from hydrological and temperature proxy data.

Jevrejeva, S., Jackson, L. P., Riva, R. E., Grinsted, A., & Moore, J. C. (2016). Coastal sea level rise with warming above 2 C. Proceedings of the National Academy of Sciences, 113(47), 13342-13347.

Kahle, D., & Wickham, H. (2013). ggmap: Spatial Visualization with ggplot2. The R journal, 5(1), 144-161.

Kohn, M. J. (2016). Metamorphic chronology—a tool for all ages: Past achievements and future prospects. American Mineralogist, 101(1), 25-42.

Kohn, M. J. (2016). Carbon isotope discrimination in C3 land plants is independent of natural variations in pCO2. Geophys. Perspect. Lett, 2, 35-43.

Kohn, M. J., Strömberg, C. A., Madden, R. H., Dunn, R. E., Evans, S., Palacios, A., & Carlini, A. A. (2015). Quasi-static Eocene–Oligocene climate in Patagonia promotes slow faunal evolution and mid-Cenozoic global cooling. Palaeogeography, Palaeoclimatology, Palaeoecology, 435, 24-37.koh

Kohn, M. J. (2010). Carbon isotope compositions of terrestrial C3 plants as indicators of (paleo)ecology and (paleo)climate. *Proc Natl Acad Sci U S A, 107*(46), 19691-19695. doi:10.1073/pnas.1004933107

Kothavala, Z. (1997). Extreme precipitation events and the applicability of global climate models to the study of floods and droughts. Mathematics and computers in simulation, 43(3-6), 261-268.

Le Quéré, C., Andrew, R. M., Friedlingstein, P., Sitch, S., Pongratz, J., Manning, A. C., ... & Boden, T. A. (2017). Global carbon budget 2017. Earth System Science Data Discussions, 1-79.

Lüthi, D. (2008). EPICA Dome C Ice Core 800KYr Carbon Dioxide Data. IGBP PAGES/World Data Center for Paleoclimatology Data Contribution Series, 55.

Nordt, L., Tubbs, J., & Dworkin, S. (2016). Stable carbon isotope record of terrestrial organic materials for the last 450 Ma yr. Earth-science reviews, 159, 103-117.

O'Leary, M. H. (1988). Carbon isotopes in photosynthesis. Bioscience, 38(5), 328-336.

Olago, D. O., Street-Perrott, F. A., Perrott, R. A., Ivanovich, M., & Harkness, D. D. (1999). Late Quaternary glacial-interglacial cycle of climatic and environmental change on Mount Kenya, Kenya. Journal of African Earth Sciences, 29(3), 593-618.

Osborne, C. P. (2008). Atmosphere, ecology and evolution: what drove the Miocene expansion of C4 grasslands?. Journal of Ecology, 96(1), 35-45.

Pagani, M., Zachos, J. C., Freeman, K. H., Tipple, B., & Bohaty, S. (2005). Marked decline in atmospheric carbon dioxide concentrations during the Paleogene. Science, 309(5734), 600-603.

Passey, B. H., Robinson, T. F., Ayliffe, L. K., Cerling, T. E., Sponheimer, M., Dearing, M. D., ... & Ehleringer, J. R. (2005). Carbon isotope fractionation between diet, breath CO2, and bioapatite in different mammals. Journal of Archaeological Science, 32(10), 1459-1470.

Porter, A. S., Gerald, C. E. F., Yiotis, C., Montañez, I. P., & McElwain, J. C. (2019). Testing the accuracy of new paleoatmospheric CO2 proxies based on plant stable carbon isotopic composition and stomatal traits in a range of simulated paleoatmospheric O2: CO2 ratios. Geochimica et Cosmochimica Acta.

R Core Team (2018). R: A language and environment for statistical computing. R Foundation for Statistical Computing, Vienna, Austria. URL http://www.R-project.org/.

Raghavan, M., Themudo, G. E., Smith, C. I., Zazula, G., & Campos, P. F. (2014). Musk ox (Ovibos moschatus) of the mammoth steppe: tracing palaeodietary and palaeoenvironmental changes over the last 50,000 years using carbon and nitrogen isotopic analysis. Quaternary Science Reviews, 102, 192-201.

Ricklefs, R. E. (2008). The economy of nature. Macmillan.

Royer, D. L. (2014). Atmospheric CO2 and O2 during the Phanerozoic: Tools, patterns, and impacts. Treatise on Geochemistry (Second Edition), 6.

Royer, D. L., Berner, R. A., & Beerling, D. J. (2001). Phanerozoic atmospheric CO2 change: evaluating geochemical and paleobiological approaches. Earth-Science Reviews, 54(4), 349-392.

Royer, D. L. (2001). Stomatal density and stomatal index as indicators of paleoatmospheric CO2 concentration. Review of Palaeobotany and Palynology, 114(1-2), 1-28.

Sage, R. F. (2004). The evolution of C4 photosynthesis. New phytologist, 161(2), 341-370.

Schubert, B. A., & Jahren, A. H. J. G. e. C. A. (2012). The effect of atmospheric CO2 concentration on carbon isotope fractionation in C3 land plants. *96*, 29-43.

Schubert, B. A., & Hope Jahren, A. (2013). Reconciliation of marine and terrestrial carbon isotope excursions based on changing atmospheric CO(2) levels. *Nat Commun, 4*, 1653. doi:10.1038/ncomms2659

Schubert, B. A., & Jahren, A. H. (2015). Global increase in plant carbon isotope fractionation following the Last Glacial Maximum caused by increase in atmospheric pCO2. *Geology, 43*(5), 435-438. doi:10.1130/g36467.1

Schubert, B. A., & Jahren, A. H. (2018). Incorporating the effects of photorespiration into terrestrial paleoclimate reconstruction. Earth-science reviews, 177, 637-642.

Sheldon, N. D. (2006). Quaternary glacial-interglacial climate cycles in Hawaii. The Journal of Geology, 114(3), 367-376.

Tans, D. P. (2012). NOAA/ESRL (www. esrl. noaa. gov/gmd/ccgg/trends/) and Dr. Ralph Keeling. Scripps Institution of Oceanography (scrippsco2. ucsd. edu/).

Tipple, B. J., Meyers, S. R., & Pagani, M. (2010). Carbon isotope ratio of Cenozoic CO2: A comparative evaluation of available geochemical proxies. *Paleoceanography, 25*(3). doi:10.1029/2009pa001851

Wang, G., Li, J., Liu, X., & Li, X. (2013). Variations in carbon isotope ratios of plants across a temperature gradient along the 400 mm isoline of mean annual precipitation in north

China and their relevance to paleovegetation reconstruction. Quaternary Science Reviews, 63, 83-90.

Wickham, H. (2016). ggplot2: elegant graphics for data analysis. Springer.

Wickham, H. (2017). The tidyverse. R package ver. 1.1, 1.

Winslow, J. C., Hunt Jr, E. R., & Piper, S. C. (2003). The influence of seasonal water availability on global C3 versus C4 grassland biomass and its implications for climate change research. Ecological modelling, 163(1-2), 153-173.

Zhang, H. Y., Hartmann, H., Gleixner, G., Thoma, M., & Schwab, V. F. (2019). Carbon isotope fractionation including photosynthetic and post-photosynthetic processes in C3 plants: Low [CO2] matters. Geochimica et Cosmochimica Acta, 245, 1-15.